AVIATION WEEK

A McGRAW-HILL PUBLICATION

SEPT. 27, 1954

50 CENTS

Convair builds the world's most advanced aircraft through...

Engineering to the Nth power

NAVY'S XFY-1 TAKES OFF AND LANDS ON A DIME

Here's a new kind of aircraft for America's aviation arsenal...the Convair XFY-1, a vertical takeoff, delta wing Navy fighter. Powered by a turbojet engine, it is one of the world's fastest propeller driven planes.

The XFY-1 is as responsive as a hummingbird over a rose bud. It rises nose-up like a guided missile ...flies like a fighter at speeds beyond 500 mph...hovers motionless...darts forward, and sideways...backs down on its tail to a feather-light landing.

This remarkable aeronautical achievement is another result of Convair's engineering for the *maximum* degree of performance... the Nth degree of air power...

Engineering to the Nth power

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION

ANY SHIP BECOMES AN AUXILIARY AIRCRAFT CARRIER WITH THE XFY-1 ON DECK!

ANY FIELD, EVEN A BACKYARD, IS AN AIRBASE FOR THE XFY-1!

ANY PLACE WHERE FIGHTER-BOMBERS ARE NEEDED, THE XFY-1 CAN OPERATE!

100 Complicated Math Problems-Per-Minute Are Solved For Him AUTOMATICALLY!

As jet-powered planes streak to new altitudes and speeds, they undergo split-second changes in temperature, pressure and moisture conditions. These changes create a flood of amazingly complex fuel metering problems. Adding to the complication are the pilot's changing demands from his engine.

Solving these fuel metering problems is equivalent to solving one hundred computations every 60 seconds! The Holley Turbine Control was developed to do the job.

Manufacturing the Holley Turbine Control required highly specialized skills, too. Working to extreme tolerances, Holley's manufacturing division has produced precision turbine controls for thousands of the nation's jet engines.

HOLLEY
Carburetor Co.

11955 NINE MILE ROAD
VAN DYKE, MICHIGAN

LEADER IN THE DESIGN, DEVELOPMENT AND MANUFACTURE OF AVIATION FUEL METERING DEVICES

Looking for fast action? Then look to pneumatics . . . the *only* actuating system that can *store* energy and deliver it *instantly* when you need it!

Because of this "storage" feature, you can get *high* horsepower delivery from a *low* horsepower source, *without* paying the usual high-horsepower weight premium!

Pneumatic systems maintain good performance through an extremely broad temperature range. From below −65° to well above 250°, viscosity of the air in the system remains essentially the same. It's never sluggish . . . won't slow down actuating time.

With pneumatics, there is no danger from fire, since the air used in the system cannot burn. And, because air is always available, there is no leakage problem. The compressor itself will compensate for leaks.

We here at Kidde have a *complete* line of pneumatic system components, including high output compressors, as well as the facilities for engineering complete pneumatic systems. If *you* have a problem in pneumatics, please write us.

Kidde

The words 'Kidde', 'Lux', and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc.,
918 Main Street, Belleville 9, N. J.

Walter Kidde & Company of Canada, Ltd.
Montreal—Toronto

Certified

TEST REPORTS FURNISHED

with each shipment of

MIL-I-7444 SPECIFICATION VINYL TUBING

from Resin Industries

A Resinite *Certified Laboratory Test Report*, sent with your shipment of specification vinyl tubing, is your positive assurance that your shipment has been tested by us and conforms exactly with its applicable specification.

Certified Laboratory Test Reports, in addition to the usual certificates of compliance, are supplied by Resin Industries, at no extra cost to you, whenever you order Resinite EP-69 (MIL-I-7444) as well as certain other Resinite Specification tubings.

Here is an added service to you, designed to speed your processing of each shipment. It is one more reason why it pays to order specification vinyl tubing from Resin Industries, Inc.

Write today for samples and performance data.

Resinite

RESIN INDUSTRIES, INC.

315 Olive St. • Box 1589 • Santa Barbara, Calif.

SPECIALISTS IN VINYL SLEEVING AND TUBING FOR THE AIRCRAFT, ELECTRONICS AND PHARMACEUTICAL FIELDS

Aviation Week

SEPTEMBER 27, 1954 VOL. 61 NO. 13

Editorial Offices
New York 36—330 W. 42nd St., Phone LOngacre 4-3000 (Night LO 4-3035)
Washington 4, D. C.—National Press Bldg., Phone NAtional 8-3414
Los Angeles 17—1111 Wilshire Blvd., Phone MAdison 6-4323

Table of Contents on Page 8

52,874 copies of this issue printed

Robert W. Martin, Jr. ..... *Publisher*

Robert H. Wood ..... *Editor*

Robert B. Hotz, *Executive Editor*

Albert W. Bentz ..... **News Editor**
David A. Anderton ..... **Engineering**
Irving Stone ..... **Technical**
G. L. Christian ..... **Equipment, Maintenance**
Katherine Johnsen ..... **Congress**
Philip Klass ..... **Avionics**
Claude O. Witze ..... **Military**
Frank Shea, Jr. ..... **Tranport**
Erwin J. Bulban ..... **Special Assignments**

William J. Coughlin ..... **West Coast**
Bernie Lang ..... **West Coast Assistant**

Henry Lefer ..... **News Desk**
Gordon C. Conley ..... **News Desk**
G. J. McAllister ..... **Washington News Desk**
Lawrence J. Herb ..... **Art Editor**
Victoria Giaculli ..... **Editorial Makeup**
Leo T. Tarpey ..... **Printing & Production**

DOMESTIC NEWS BUREAUS

Atlanta 3 ..... 801 Rhodes-Haverty Bldg.
Chicago 11 ..... 520 No. Michigan Ave.
Cleveland 15 ..... 1510 Hanna Bldg.
Detroit 26 ..... 856 Penobscot Bldg.
Houston 25 ..... 1303 Prudential Bldg.
Los Angeles 17 ..... 1111 Wilshire Blvd.
San Francisco 4 ..... 68 Post St.
Washington 4 ..... 1189 National Press Bldg.

FOREIGN NEWS SERVICE

Editor ..... Joseph K. Van Denburg, Jr.
London ..... Edward W. S. Hull
Paris ..... John O. Coppock
Bonn ..... Gerald W. Schroder
Manila ..... Herbert Leopold
Mexico City ..... John Wilhelm
Sao Paulo ..... Lionel J. Holmes
Tokyo ..... Alpheus W. Jessup

Aviation Week is served by PRESS ASSOCIATION, INC., a subsidiary of Associated Press.

Research and Marketing: Irma Nelidow, Mary Whitney Fenton and Jeanne Rabstejnek.

J. G. Johnson ..... *Business Manager*

T. B. Olsen, **Promotion Manager** W. V. Cockren, **Production Manager**

Sales Representatives: J. C. Anthony, **New York**; H. P. Johnson, **Cleveland**; D. T. Brennan and J. S. Costello, **Chicago** and **St. Louis**; E. P. Blanchard, Jr., **Boston**; James Cash, **Dallas**; William D. Lanier, Jr., **Atlanta**; R. E. Dorland, **San Francisco**; C. F. McReynolds and Gordon Jones, **Los Angeles**; W. S. Hessey, **Philadelphia**; C. A. Ransdell, **Detroit**. Other sales offices in **Pittsburgh, London.**

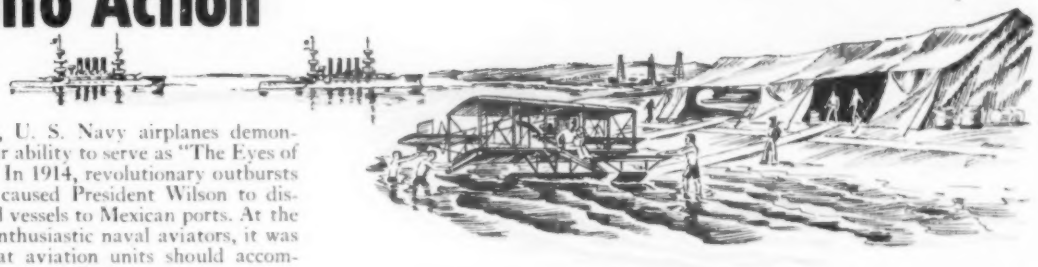
AVIATION WEEK • SEPTEMBER 27, 1954 Vol. 61, No. 13
Member ABP and ABC

Published weekly by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. **Publication Office: 99-129 North Broadway, Albany 1, N. Y.**
Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Executive Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.
Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow 10 days for change of address.
Subscriptions are solicited only from persons who have a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.
Single copies 50c. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada $8 a year; $12 for two years; $16 for three years, payable in Canadian currency at par. Other Western Hemisphere and the Philippines $10 a year; $16 for two years; $20 for three years. All other countries, $20 a year; $30 for two years; $40 for three years. Entered as second-class matter July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A. Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable Address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

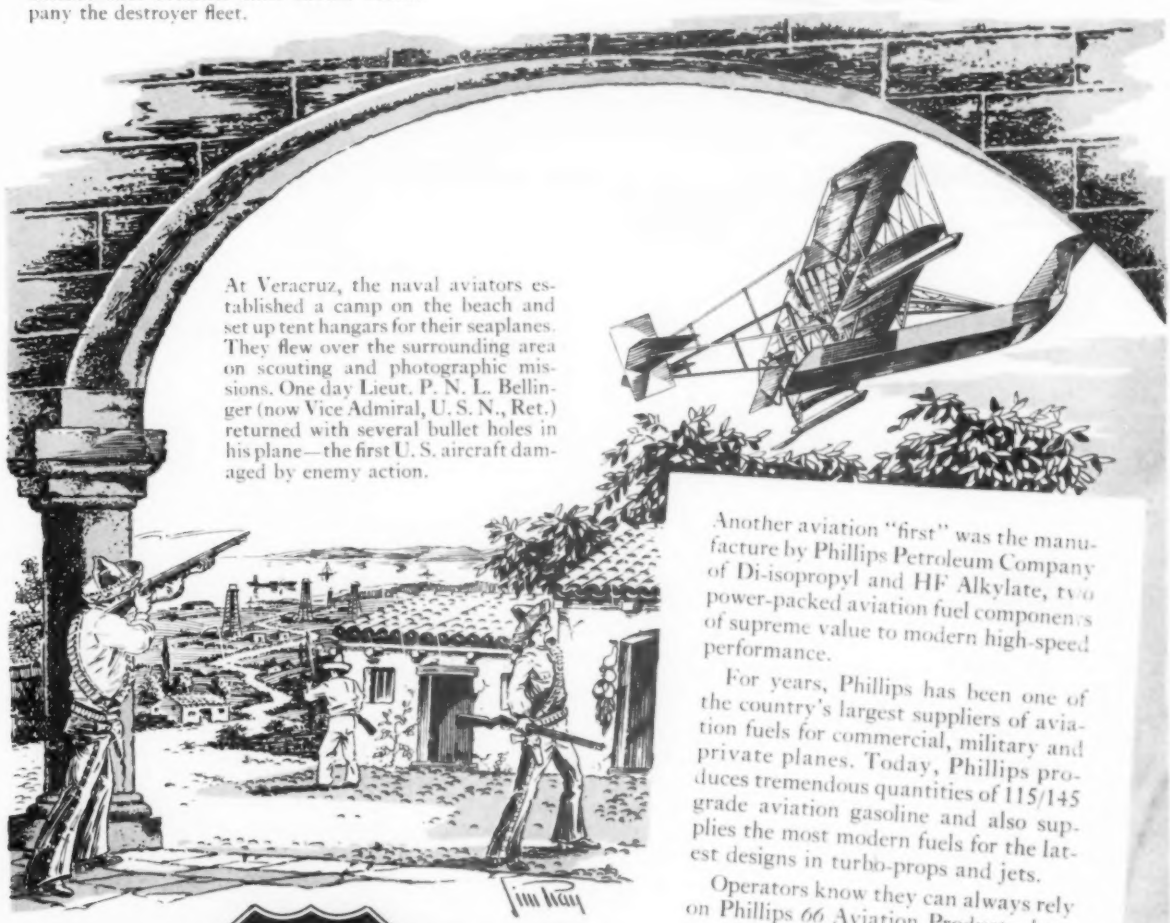
Phillips 66
PRESENTS

MILESTONES IN AVIATION

The "Eyes of the Fleet" Go into Action



Very early, U. S. Navy airplanes demonstrated their ability to serve as "The Eyes of the Fleet." In 1914, revolutionary outbursts in Mexico caused President Wilson to dispatch naval vessels to Mexican ports. At the urging of enthusiastic naval aviators, it was decided that aviation units should accompany the destroyer fleet.



At Veracruz, the naval aviators established a camp on the beach and set up tent hangars for their seaplanes. They flew over the surrounding area on scouting and photographic missions. One day Lieut. P. N. L. Bellinger (now Vice Admiral, U. S. N., Ret.) returned with several bullet holes in his plane—the first U. S. aircraft damaged by enemy action.

Another aviation "first" was the manufacture by Phillips Petroleum Company of Di-isopropyl and HF Alkylate, two power-packed aviation fuel components of supreme value to modern high-speed performance.

For years, Phillips has been one of the country's largest suppliers of aviation fuels for commercial, military and private planes. Today, Phillips produces tremendous quantities of 115/145 grade aviation gasoline and also supplies the most modern fuels for the latest designs in turbo-props and jets.

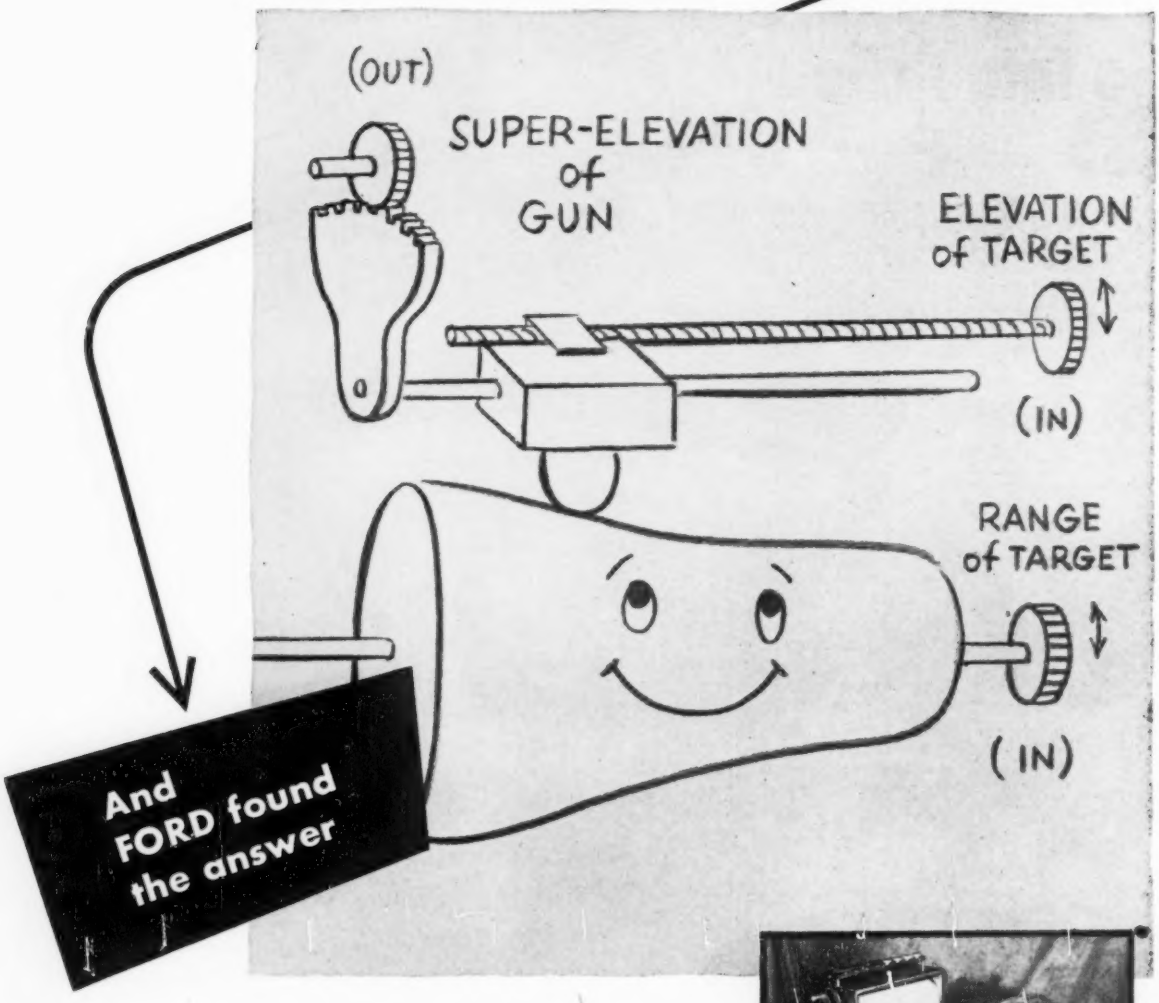
Operators know they can always rely on Phillips *66* Aviation Products, long noted for quality and efficiency.

AVIATION DIVISION
PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA

Phillips 66

AVIATION PRODUCTS

HOW TO TAP THE BRAIN
of a piece of metal



In making computers, such information as mathematical functions can be stored in a precision-cut cam, thus allowing its follower to be displaced in accurate reply to the input position of the cam. Ford Instrument Company designs and makes cams of all sizes and shapes to achieve these results. To manufacture such cams with the precision demanded, the engineers of Ford Instrument have devised remarkable automatic machines which, by following a carefully plotted ink line on a roll of paper, cut the exact shape into the metal. Then, careful point-by-point checks, sometimes as many as 2000 measurements, insure finest accuracy.

If you have a cam problem—call on Ford Instrument Company.

You can see why a job with Ford Instrument offers young engineers a challenge. If you can qualify, there may be a spot for you in automatic control development at Ford. Write for brochure about products or job opportunities. State your preference.

28

FORD INSTRUMENT COMPANY

DIVISION OF THE SPERRY CORPORATION

31-10 Thomson Avenue, Long Island City 1, N. Y.

NEWS DIGEST

Turboprop Super Connie Goes Aloft

Tagged by Lockheed Aircraft Corp. as "the world's fastest propeller-driven transport," here is the new Navy R7V-2 Super Constellation in the air at the start of its flight-test program. Its four P&WA T34 turboprops turn Hamilton Standard Turbo-Hydromatic props and deliver a total of 22,200 hp., giving the R7V-2 a cruise speed of about 440 mph.—approximately 100 mph. faster than current piston engine airliners. This is the first of four turboprop Super Connies. Two each will be made for USAF and Navy.

Domestic

Aircraft atomic reactors will have a maximum diameter of five feet and will develop heat at a rate of 100,000 hp. to produce 20,000 hp. or more for high-speed propulsion, estimates Kenneth Kasschau, manager of American Locomotive Co.'s atomic energy department.

Thrust reverser for turbojet engines, designed and built by Air Research and Development Command's Wright Air Development Center at Dayton, is undergoing flight tests on a J65-powered Republic F-84F. The device uses a series of cascades and two movable flippers to divert thrust forward.

New loading device that wheels airliners flush against a passenger terminal pier or cargo dock will be tested soon in a pilot installation at New York's Idlewild International Airport. Transports will taxi onto the Whiting Loadair, which will move the aircraft sideways to its loading slot.

Final cost of Arnold Engineering Development Center at Tullahoma, Tenn., will be $260 million, estimates Brig. Gen. Samuel Harris, Jr., AEDC commander. Cost so far: $189.5 million.

Lorne Kennedy, onetime administrative assistant to four Nebraska senators and former Washington correspondent for the Omaha World-Herald, has become executive assistant to Fred A. Seaton, Assistant Secretary of Defense for Legislative and Public Affairs.

United Air Lines DC-7 flew from San Francisco to New York in 6 hr. 34 minutes Sept. 19, claimed as a new record for nonstop transcontinental flights.

John P. Dennis, former traffic manager of the Texas Co., has been appointed coordinator of defense transportation for the Office of Defense Mobilization, responsible for reviewing and developing plans for transportation mobilization in an emergency.

Last P&WA R4360 to be produced by Ford Motor Co.'s Aircraft Engine Division has rolled off the Chicago assembly line. Ford's total for R4360s: 3,079.

Seaboard & Western Airlines Super Constellation lifted a 27,458-lb. cargo from Hamburg, Germany, to New York Sept. 17, claimed as a new record for westbound trans-Atlantic commercial flights.

Helicopter passenger service will be started in Cleveland Oct. 15 by Cleveland Air Taxi, Inc., formed recently by Kenyon C. Bolton. The new copter taxi and charter company now owns two Bell 47Gs, plans to buy additional aircraft if business grows.

Arthur Godfrey, grounded since Mar. 16 for violating takeoff instructions at Teterboro (N. J.) Airport, has won back his pilot's license. The radio and television star passed a flight test in his DC-3 Sept. 17.

Edward O. Seits, manufacturing executive assistant at North American Aviation's Los Angeles plant and former president of the National Association of Foremen, died Sept. 13.

Financial

KLM Royal Dutch Airlines has refinanced with the National City Bank of New York and Chase National Bank of New York the $5.6-million balance of a $7-million loan negotiated in 1952 to back aircraft purchases in the U. S. The original loan was made by the International Bank for Reconstruction and Development.

International

South African Airways has decided to buy three Douglas DC-7Bs, will put the transports on Johannesburg-London flights soon after delivery in early 1956. Total price: approximately $8 million, including spares and radio installations.

Airpower expenditures by Royal Canadian Air Force totaled $140,573,000 during the first quarter of 1954-55, a drop of $36 million from the same period of 1953-54.

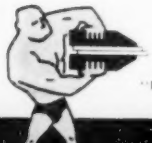
Largest troop airlift contract awarded by British Air Ministry has been given to Airwork, Ltd., independent carrier, following competitive bids. Airwork will fly about 7,000 soldiers annually for two and a half years between Britain and Singapore in Handley Page Hermes. Contract value: $8.4 million.

New Japanese airline has been formed to transport Japanese immigrants to Brazil, according to reports from Sao Paulo.

New $5-million terminal will be started next year at Montreal's Dorval International Airport.

Monogram is proud to distribute these inserts and studs which are of the same fine quality and high precision as Monogram Clamps and applying tools. For complete information, call your Monogram representative today.

*For Kelox Products in the balance of the United States, contact Fasteners, Inc., 1 West 47th St., New York 36, N. Y.



"MIGHTY MO"

MONOGRAM
MANUFACTURING COMPANY
A DIVISION OF LEWIS AND KAUFMAN, LTD.
8557 Higuera Street, Culver City, California

The Aviation Week

September 27, 1954

Headline News

Tigers Cancel Merger, Quit Airfreight 14
Boeing 707 in Buffet Boundary Tests. 15
Great Circle Bid by PAA..... 16
Air Industry: $7,044 for Lobbying.... 16
Rocket Engines Boost Copter Payload. 17
SEC Reports Aircraft Stock Sales.... 18
Titanium Plant to Up U. S. Output... 18
Small Firms Get Bigger AF Share... 19

Aeronautical Engineering

Space Flight Needs Money, Time..... 46

Production

Allison Streamlines J33 for Matador.. 58

Avionics

WESCON Unveils Avionic Devices... 70

Equipment

How Bomber Jets Get Their Start.... 65

Air Transport

IATA Looks to Cargo for Profits..... 96
Overseas Charters May End Rate File. 99
CAA Sets Up Approach Light Rules.. 99
ATA, ALPA Clash on Heat Rule..... 101
CAA Control Tower Operations Up.. 101
MATS, Civil Overlap to Be Studied... 101
Chamber Studies Airline Policy..... 102

Editorials

Persuading Motorists to Fly..... 106
Slow Down the Mails!..... 106
Helping Communities in Trouble.... 106

Departments

News Digest 7
Industry Observer 10
Who's Where 10
Washington Roundup 13
USAF Contracts 62
What's New 68
Filter Center 85
New Aviation Products 86
Also on the Market 89
CAB Orders 102
Shortlines 102
Aviation Calendar 102
Picture Page 104

Picture Credits

7—Lockheed; 16—Fairchild Aircraft; (center, right; bottom) Reaction Motors; 20—Bell; 58—(top) Glenn L. Martin; (bottom) Allison Division; 59—Allison Division; 65—(top) Boeing Airplane; (bottom) Caterpillar News; 66—Caterpillar News; 70, 72, 74—Bell Labs; 99—PAA.

DOW CORNING CORPORATION

Silicone News

FOR DESIGN ENGINEERS

Modified Silicone Finish Used On Vehicle Heaters For Its Superior Heat And Salt Spray Resistance

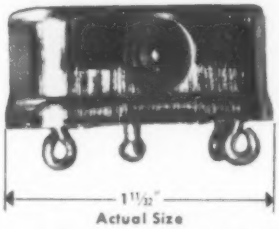
Heaters manufactured for use in Ordnance vehicles by the Southwind Division of Stewart-Warner Corporation must withstand temperatures far higher than those involved in civilian applications. In the process of selecting the best finish for these units, the relative heat and corrosion resistance of organic and modified silicone paints were severely tested. The photograph shows the results.

The heater shell at left was sprayed with a modified silicone paint which is formulated by Midland Industrial Finishes, and baked for 30 minutes at 400 F. A similar unit, at right, was sprayed with conventional olive drab (TT-E-485b), and baked for 45 minutes at 250 F. Panels in the foreground illustrate the appearance of both finishes before testing.

Both shells were held at 500 F for 4 hours. The conventional finish was then exposed to salt spray for 100 hours. The modified silicone finish was similarly exposed to a salt spray for 300 hours or three times as long. The organic finish was stained, faded, and badly disintegrated, while the silicone coating remained virtually unchanged. As a result, Stewart-Warner specified the modified silicone finish for all such heaters. *No. 1*

"What's a Silicone?" is the title of a 32-page booklet which answers that often asked question. Indexed and illustrated, this booklet is an interesting and informative description of silicones. *No. 2*

Miniature Snap-Switch Sealed with Silastic Has Longer Life and Greater Reliability



Actual Size

A Silastic® diaphragm has enabled Haydon Switch, Inc., of Waterbury, Connecticut, to produce a hermetically sealed snap-action switch that weighs only about half an ounce and operates with less than half the effort required by standard "aircraft quality" switches.

The Silastic diaphragm remains so flexible that the operating force on the actuator need not exceed 32 ounces even at —90 F. Fatigue problems and subsequent unreliability associated with metal diaphragms are eliminated. Operational life in the range of a million cycles is far in excess of the best metal diaphragm or bellows.

Accelerated permeability tests indicate that the Silastic diaphragm maintains an effective hermetic seal for more than 10 years. Internal pressures up to 100 psi have failed to produce leakage or rupture, and no change in the diaphragms has been observed even after 72 hours' immersion in salt, fresh or soda water, or in automotive or AN-0-6 aircraft oil.

Originally designed for aircraft, fire control and guided missile service, the new miniature switch is being applied to domestic and commercial washing machines, machine tools and other equipment exposed to liquids or moisture.

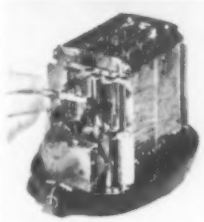
That's the kind of performance that has established Silastic as an ideal diaphragm material where pressures must be maintained despite temperatures from —100 to 500 F, weathering and oxidation, or in contact with a variety of oils and chemicals. Silastic is also unique among resilient dielectric materials because it combines high thermal conductivity with excellent resistance to moisture, corona and to fatigue.

® T.M. REG. U.S. PAT. OFF. *No. 5*

"Tall Tales and Fabulous Facts" a 24-page booklet in which a parallel is drawn between the tall tales our ancestors told about legendary characters and some equally fabulous facts about Dow Corning silicones. *No. 3*

Westinghouse is Always Sure With Silicone Lubricants

For the past six years Westinghouse Electric Corporation has employed Dow Corning silicone fluids and greases to assure lifetime lubrication for their automatic toasters. Besides being used on the latch lever pivot, Dow Corning 41 Grease is also brushed on the guide bars and latch bar, as shown in photograph. A Dow Corning fluid lubricant, 710R, is applied to the pivots and bearings of the toaster timer.



Despite operating temperatures ranging up to 400 F, these silicone lubricants stay in place without oxidizing or hardening. Six years of trouble-free service have convinced Westinghouse that they are ideal lubricants for the job. *No. 4*

Design Edition 1

DOW CORNING CORPORATION - Dept. D-21
Midland, Michigan

Please send me more data on numbers:
1 2 3 4 5

NAME_____

COMPANY_____

TITLE_____

CITY_____ ZONE____ STATE_____

ATLANTA • CHICAGO • CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEW YORK • WASHINGTON, D. C. (Silver Spring, Md.)
Canada: Dow Corning Silicones Ltd., Toronto; **England:** Midland Silicones Ltd., London; **France:** St. Gobain, Paris

INDUSTRY OBSERVER

▶Controversy exists on freezing point for kerosene to be used in Capital Airlines' Rolls-Royce Dart-powered Vickers Viscounts. Rolls and Capital want −40F fuel, while U. S. oil companies supply kerosene with −30F freezing point. Lower freezing point would require importation of fuel to British specs and special handling from refinery to airfield.

▶Air Transport Assn. is disturbed over evident determination of Civil Aeronautics Administration to be tough about airworthiness regulations for jet transports. If jets come into use without specific Civil Aeronautics Board rules in force, CAA indicates it will make its own and that a highly cautious approach will be used.

▶Defense Department is spending as much money on guided missile research and development as it is on piloted aircraft research and development. Work is under way on at least 26 different models of guided missiles, Aircraft Industries Assn. reports.

▶Pan American Airways is experimenting with a two-way version of Selcal (selective calling system) to enable its aircraft to acknowledge ground-station calls automatically without any action by the crew. Another feature will enable the pilot to broadcast an emergency signal that identifies the troubled aircraft by merely pushing a buton.

▶First leg of United Air Lines' new transcontinental VHF communications network between Chicago and Cleveland, which will be owned and maintained by American Telephone & Telegraph Co. and leased to UAL, is slated to go into operation soon. Next segment, which will connect Boston, New York and Washington, will be tied in shortly afterwards.

▶Government will increase its contracts with private firms for maintenance of aircraft to $625 million in 1955 or about 50% of the total maintenance costs. Maintenance by private firms has grown rapidly since 1952 when only 21% was handled by commercial companies.

▶Bendix Radio has decided to build a C-band airline radar, as well as X-band, following United Air Lines decision to buy a fleetwide installation of C-band equipment. UAL expects to begin evaluation tests on RCA and Bendix C-band radars early next year.

▶Army recently has discovered effective, if troublesome, way to combat dirt in helicopter engines. Hot and cold air filters will do the job if they are changed twice a day during routine operations off paved landing areas.

▶Indications were strong last week that an outside agency, either the military or a civilian contractor, will get the job of processing the large number of Republic F-84Fs stored outdoors for months at the company's Farmingdale, N. Y., plant to bring them up to USAF acceptance standards. Continuing pileup has necessitated a 40% reduction in Republic production and large layoffs to slow accumulation of planes requiring modifications.

▶Piasecki Helicopter Corp., has contract to study turbine installation possibilities for the H-21 Work Horse. Contract for construction of prototype will depend on outcome of engineering report to Army Transportation Corps. Turbomeca Artouste 2, used in Sikorsky XH-39 (AVIATION WEEK Sept. 13, p. 17) is only one of several turbine engines being considered. Turbomeca installation would call for four engines to replace present single Wright R1820-103. Meanwhile, Navy is expected to order two HUP prototypes with Wright R1300 engine replacing the Continental R975-46. Designation would be HUP-4.

▶United Air Lines and IBM are investigating the use of punchcard computers to speed the calculation of transcontinental flight plans. Objective is to allow preparation of half a dozen flight plans in advance, then let pilot select best one for conditions existing at flight time.

WHO'S WHERE

In the Front Office

W. Paul Jones, vice chairman of the board of Servel, Inc., will become president of Kellett Aircraft Co., Camden, N. J., Oct. 1. He will continue to hold his present position at Servel, acting as a consultant and adviser.

Per A. Norlin has resigned as managing director of Scandinavian Airlines System, will be succeeded by **Henning Throne-Holst**.

Morris Shipley has been elected an assistant vice president of American Airlines and appointed chief of its Washington, D. C., office, succeeding **Carlene Roberts**, who resigned this month.

S. Davis Bronson has formed Bronoptics Co. at Sherman Oaks, Calif., specializing in research and development for West Coast instrument manufacturers.

Changes

Charles H. Shuff is director of Westinghouse Electric International Co.'s new defense relations department at Pittsburgh, set up to supply aircraft turbine engines and other equipment overseas.

Edward M. Lind has resigned from Pan American World Airways to join International Air Transport Assn. as enforcement officer, with headquarters in New York.

K. M. Miller has become assistant general manager of the Research and Development Division of Lear, Inc., Santa Monica.

Frank A. Ryan has been appointed general manager of United Aircraft Products' contractural engineering department, Dayton, Ohio.

E. L. Dare has been promoted by United Air Lines to superintendent of cargo development, and **R. L. Mangold** has moved up to superintendent of cargo sales. **L. T. Long** is new director of personnel relations on UAL's engineering and maintenance staff. New managers: **P. A. Fruchauf**, aircraft engineering; **W. H. Pitt**, line service engineering; **P. A. Wood**, engineering planning. New engineering superintendents: **A. F. Trumbull**, radio; **J. A. Aldrich**, electrical and instrument; **E. U. Fairbanks**, structures and controls; **Charles Perry**, equipment and systems; **H. N. Taylor**, powerplant; **E. P. Buckthal**, base service. **E. M. Hayes** is United's new representative at Douglas Aircraft Co.

Honors and Elections

A. B. Hegner, production manager for Fairchild Engine & Aircraft Corp.'s Engine Division, will be general chairman of the 1955 Society of Automotive Engineers Production Forum next April.

Maj. K. M. Beaumont of Britain has been elected legal committee chairman of the International Civil Aviation Organization. New vice presidents: **C. Gomez Jara** of Spain and **Dr. Diaeddine Salch** of Egypt.

W. W. Shepherd, president of the Shepherd Tractor & Equipment Co. of Los Angeles, has been appointed to the California Aeronautics Commission, succeeding **Earl Prudden**, who resigned.

"Triple Threat"

Chance Vought Aircraft's potent F7U-3 Cutlasses, now entering squadron service with the U. S. Navy, are an outstanding example of versatility and striking power in modern carrier-based jet aircraft. Using a wide variety of armament, Cutlasses are designed to fly and fight as intercreptors, fighters or attack planes.

Chance Vought Aircraft INCORPORATED

DALLAS, TEXAS

fine weather for **DUCKS** *and Arma* **"ALL-WEATHERED"** *fighter bombers*

Arma's self-contained integrated navigation and fire control systems will contribute materially to the operational effectiveness and all-weather capabilities of our nation's latest tactical fighter bombers.
Arma . . . Brooklyn, N. Y.; Garden City, N. Y. A division of American Bosch Arma Corporation.

ARMA ADVANCED ELECTRONICS FOR CONTROL

ENGINEERS—write or visit Arma for complete information on challenging opportunities in our engineering division.

ARTHUR GOLLERT

Washington Roundup

Republic Visit

Visits of USAF troubleshooters to aircraft plants with production difficulties are common, but last week Republic Aviation Corp. received top-level treatment for its problems. Off to Farmingdale went a team composed of Charles E. Wilson, Secretary of Defense; Harold E. Talbott, Secretary of the Air Force; Frank D. Newbury, Assistant Secretary of Defense for Applications Engineering, and Maj. Gen. Clarence S. Irvine, Deputy Commander for Production of AMC.

According to USAF, the trip was made necessary by concern over loss of production and the recent layoff of a large number of skilled workers. There was speculation, however, that Republic is making a strong bid to get a major production order for the F-84J, powered by the General Electric J73 engine. Noticeably absent from the VIP group visiting Republic was Roger Lewis, Assistant Secretary of the Air Force for Materiel, who is in Europe and will return at the end of this week. Lewis is said to be opposed to the F-84J project.

More Titanium

Another round of expansion of titanium ingot capacity is in the offing. Government contracts already let will boost output to 22,500 tons annually by 1957. This year's production will approximate 5,000 tons.

General Services Administration is on the verge of concluding a contract with duPont de Nemours for construction of a plant in Tennessee with capacity for 7,500 tons annually. Contract negotiations are underway with five other firms. GSA is conducting preliminary discussions with 10 other firms.

New Navy Regulation

Navy's Bureau of Aeronautics is rewriting its provisioning document on special tools and ground handling equipment. The 1,050 rules force BuAer to budget for individual items, result in a great deal of wasted correspondence and time.

New regulation is not completed, but aim will be to make prime contractor responsible for providing special tools and equipment and force a stepup in delivery dates. Navy also would be assured that its test equipment and tools will be identical to those used by manufacturer. Prime contractor would get flat 2% added to contract price to pay for material.

Shotgun Wedding

Aircraft manufacturers facing an irate local community because of noise created by planes or test facilities can profit from a copy of "Shotgun Wedding," 19-page booklet published by Air Defense Command, Colorado Springs, Colo. Designed to familiarize all ADC personnel with the command's nationwide problem of living with its neighbors, the booklet cites noise, hazards, air space congestion and joint use of airports with civilian planes as major sources of ADC unpopularity.

Case history describes how commander of a Midwest base analyzed local complaints, and mapped a program to offset them, using community leaders, press, radio, civic clubs and allied organizations to win friends for his jet pilots. Public support can be had, ADC has found, but you must win it.

Aid for Pakistan

Foreign Operations Administration now is engaged in negotiations with two U. S. airlines to provide technical assistance in training Pakistan nationals in the operation of a domestic airline in that country.

Plan calls for the airline selected to recruit a team of 32 persons who are familiar with the various phases of airline operations and then assign them to duty with the Pakistan airline. Principal need is for maintenance experts. The contract with FOA will run at least three years, and a third of the cost will be paid by Pakistan.

Two FOA air staff consultants, J. T. Milliken, an airline economist, and B. F. Sherill, former airline pilot, recently returned from surveys in Pakistan, Iran and Turkey. Technical aid programs also are being planned for Iran and Turkey. To qualify for FOA assistance, the country concerned must have the potential to support a commercial airline operation. Other nations in the general Middle East area are scheduled to be surveyed.

Mirror Landing

U. S. Navy is evaluating British development of mirror approach system landing aid for carrier decks (AVIATION WEEK May 3, p. 43). Secretary Charles S. Thomas, in speech at Los Angeles, said "our first look is promising."

Device permits pilot to make carrier landing without landing signal officer's aid. He keeps his plane in position so that light on carrier is reflected in deck mirror and makes perfect landing regardless of ship's pitch or roll. Thomas claims system will reduce carrier landing accidents, cut down on maintenance and permit use of lighter planes.

Viscount Certification

Civil Aeronautics Administration expects early compliance with the 26 conditions of validation for the Vickers Viscount outlined by Administrator Fred B. Lee in a July letter to the British Air Registration Board.

Under bilateral agreement, CAA accepts ARB certification that conditions have been met. First deliveries to Capital Airlines are scheduled for early spring delivery. Conditions run from standards for temperature accountability to specifications for compartment door locks.

Management by USAF

Activation of 10 new Air Force wings and about 80 radar sites in the next fiscal year would, under ordinary circumstances, necessitate the services of 40,000 men. Actually, however, Air Force will be increased only by 5,000 officers and airmen in that period. The answer "of how we build units of 40,000 with only 5,000 more men lies in management," according to Gen. Thomas D. White, Vice Chief of Staff.

Congress, he told a manpower management training class at George Washington University, has given USAF more freedom to interchange money between civilian and military personnel so long as the policy aids in the economy effort. Newest program is "Operation Home Front," which will substitute civilians for military personnel along the pattern set by "Operation Native Son" in foreign countries. White says action is forced by poor reenlistment rate, which will not hit 33% of the figure USAF set as goal. —Washington staff

AVIATION WEEK VOL. 61, NO. 13
SEPTEMBER 27, 1954

Tigers Cancel Merger, Quit Airfreight

- **Slick Airways will stay in air cargo field.**
- **But FTL sees profit in plane-leasing business.**

Burbank, Calif.—Flying Tiger Line is abandoning the airfreight business and canceling its merger with Slick Airways.

President Robert Prescott says inability of the two lines to carry out labor protective provisions imposed on the merger by Civil Aeronautics Board is responsible for the decision.

"Our company has decided to withdraw from the airfreight field and establish new operations in the leasing of equipment and possibly participate in contract flying," Prescott says.

Slick will continue operations as a freight airline.

▶**New Slick Chief**—Delos Rentzel, former CAB chairman and Civil Aeronautics Administrator and onetime Commerce Undersecretary for Transportation, is expected to be elected chief executive officer of Slick at a board meeting this week, called to set up new company officers.

Rentzel would take over the duties of Thomas L. Grace, president, who resigned effective Sept. 20.

Joseph F. Grant, former vice president and secretary-treasurer of Slick, is general manager of the airline under the interim management arrangement.

▶**The New Setup**—Under the agreement, Slick will sell its two DC-6As to Flying Tigers for $1.6 million, leasing them back to Slick for $25,000 per month each for six years, with an option to renew for three years at $5,000 each.

Tigers also will lease its one DC-6A to Slick at a monthly rental of $35,000 for one year. However, Slick has an option, if exercised before Jan. 1, to lease this plane at a rate of $30,000 per month for three years or for six years at a rate of $25,000.

Slick also will lease seven C-46s, now owned and operated by FTL, at a rental of $1,500 per month for two years.

Flying Tigers' return over nine years from the purchase-lease arrangement on the two Slick DC-6As would total $3.96 million against the purchase price of $1.6 million. On its own DC-6A, the total gross would be $420,000 for one year, $1,080,000 for three years, $1.8 million for six years.

▶**Maintenance**—The leases will provide that the equipment be maintained by Slick and returned in "good and flyable condition," less normal wear and tear.

Slick also must maintain insurance to cover the cost or market value of the aircraft. On the two planes purchased from Slick, the insurance coverage must be adequate to cover the unpaid balance.

▶**Nine-Year Fight**—Withdrawal of Flying Tigers from the airfreight field marks the end of a struggle that began June 25, 1945, when Prescott and 14 other pilots who flew with him as members of Gen. Claire Chennault's Flying Tigers in China organized the first all-freight airline.

Samuel D. Mosner, president of Signal Oil Co., and three associates furnished the funds put up by the pilots to finance the company.

Prescott says Flying Tigers will withdraw the application now pending before CAB for renewal of its airfreight certificate.

Commenting on whether the Tigers might re-enter the airfreight field at some future date, Prescott says: "We made our stab at it and that's it. . . .

"We believe our new field offers a most attractive opportunity for us," the FTL executive says. "Preliminary studies indicate we can expect to earn a profit in excess of $1 million a year in the leasing of equipment, and accordingly, we are preparing plans for the acquisition of new equipment beyond our present fleet of 39 DC-6A, C-54 and C-46 aircraft."

▶**Bankruptcy Provisions**—Flying Tiger and Slick estimate that the labor provisions of the merger agreement approved by CAB might cost as high as $6 million and would result in bankruptcy of the merged company. The two carriers petitioned for relief from these provisions, asking the Board, Air Line Pilots Assn. and Slick Independent Airways Assn. to modify the terms. The pilot unions opposed this, while CAB held that full hearings should be held.

The two companies decided to abandon the merger rather than become involved in lengthy hearings, which they believed would be fatal to both airlines.

Bureau counsel Albert H. Ruppar flew to Los Angeles to study the situation earlier this month but opposed the petition for relief (AVIATION WEEK Sept. 6, p. 72).

Ruppar said conditions imposed by CAB were based on the record developed during the hearing on the merger case. He added that validity of the estimate of what the labor provisions would cost Flying Tiger-Slick could be tested only in a full hearing.

Merger of the two airlines was celebrated May 12, although it was never carried to completion. The pilot dispute over seniority between ALPA, representing Tiger pilots, and the Slick company union was an obstacle to the merger. Refusal of the pilots to agree to modification of the labor provisions touched off the final decision to abandon the merger.

▶**1,200-Man Layoff**—A company spokes-

Proposal Bypasses Labor Problem

The new Slick Airways-Flying Tiger Line proposal, under which Slick will be the operating airline and FTL the equipment company, appears to assure against the prospect of labor claims.

An outright merger was snagged because the 1938 Civil Aeronautics Act would force the two airlines to pay between $3 million and $6 million in claims for projected layoffs, Tigers and Slick report.

Flying Tigers' certificate as an air carrier expired Aug. 12. Its status continued, pending Civil Aeronautics Board action in its application for renewal.

Under the new proposal, FTL withdraws the renewal application. This means that as of Aug. 12, the airline is not subject to the 1938 Act—and its labor claim requirements.

Early CAB action is expected on the new Slick-Flying Tiger proposal. The two companies claim in their petition that "unless this agreement can be put into effect by Oct. 1 or immediately thereafter, it cannot be consummated."

A spokesman for Slick reports that all company employes have agreed to take salary cuts in order to keep the airline flying in the freight business.

man says the Tigers' withdrawal from the airfreight business is expected to result in the layoff of some 1,200 employes, although a number of these may be absorbed into Slick's expanded operation.

The airlines are faced with the problem of working out a readjustment of bookkeeping, contracts and other joint activities in which they had entered pending final settlement of the merger.

In many cities, as well as at company headquarters, the two carriers already had merged their facilities. Since Slick will continue in the airfreight business, facilities will be turned over to that line.

A spokesman for the Flying Tigers says its officers will resume their former positions, with Prescott as president. The executive staffs of the two carriers had been combined at the time the merger took informal effect.

Rentzel, who reportedly turned down an offer to take over the presidency of Northwest Orient Airlines, is president of the Texas Auto Transports, Inc., Oklahoma City. A graduate of Texas A&M College, he joined American Airways as a radio operator in 1931, became president of Aeronautical Radio, Inc., in 1943.

He was appointed CAA Administrator in 1948, CAB chairman two years later and served as Undersecretary of Commerce for Transportation from May 1951 until 1953, when he became vice president of W. R. Grace & Co. He resigned the latter position shortly after and set up the Oklahoma City company.

FTL will continue its freight operation until Slick is in a position to take over, expected within a few weeks. This will depend upon how quickly CAB acts on the withdrawal agreement submitted last Monday.

▶ **Route Breakup**—The decision to abandon ended the first transcontinental merger ever approved by CAB, created in 1938 after present transcontinental passenger lines were established. It also marked the breakup of the longest domestic route system in the nation, which served 45 cities.

Prescott told intimates off-the-record several weeks ago that he would break up the merger and go out of the airfreight business before submitting to the labor demands.

"It frankly is a question of do that or go bankrupt," he said. "The problem is to make the unions understand that I am serious about this and not just using it as a threat."

It became apparent to all concerned last week that Prescott meant what he said.

▶ **Anticipated Move**—CAB issued an order last Monday denying the Slick-Tiger petition for labor protective provision changes without a hearing. The action taken by the two freight airlines anticipated the Board's move.

SLICK REPLACEMENT: Delos W. Rentzel.

In a petition to CAB, the two airlines said:

"Due to the magnitude of the potential liability under labor protective provisions included in the Board's order of approval and due to the fact that the Board has not seen fit to modify these provisions by Sept. 15, as requested, your petitioners cannot complete the merger and continue in the airfreight business."

The petition was accompanied by a copy of the agreement reached by the two companies, which took Flying Tigers out of the airline business, left Slick the lone transcontinental air all-cargo carrier.

▶ **The Petition**—CAB's order denying the petition for labor protective changes without a hearing pointed out that the two airlines said their exposure to claims ranges from $3.2 million to $6.2 million, depending upon the manner in which the seniority lists of the two firms would be integrated.

They said the "tremendous contingent liability" would ruin the credit of the surviving company, might throw outstanding bank loans into default and could jeopardize arrangements for additional bank loans now completed to finance the acquisition of vitally needed equipment.

The two carriers argued that under their proposed modifications in the protective conditions, they believed their exposure to claims would range only from $200,000 to $300,000.

"It is alleged that if the proposed modifications are not made an accomplished fact within a few weeks, the merger must be abandoned," said the Board order.

▶ **The Decision**—After considering the petition, CAB concluded that the relief requested should be denied.

"The proposed modifications in the protective conditions are clearly so extensive as to constitute a major revision of the existing conditions. Since these conditions were based upon an evidentiary record after full hearing was afforded to all interested parties, it would be strange indeed if the Board were now to undertake a complete overhauling of the conditions through a summary procedure. . . .

"The proposed changes in the conditions are based upon many conclusions and statements of alleged fact which can only be tested adequately by an evidentiary hearing wherein all interested parties may participate."

CAB said the mere fact that companies might be affected adversely by the delay caused by a full hearing would not justify the Board in dispensing with the hearing "to the prejudice of the other parties to the proceeding."

CAB said it has not been insensitive to the problems of the two airlines and has "stood ready at all times to lend its assistance, to the extent consistent with the Board's duties and responsibilities under the Act."

Boeing 707 Starts Buffet Boundary Tests

Boeing Airplane Co. will fly its prototype 707 jet Stratoliner-Stratotanker to its "buffet boundary" to determine the transport's maximum speed as part of its initial flight program, interrupted by damage to the nosewheel assembly Aug. 5 (AVIATION WEEK Aug. 16, p. 377).

During this phase of the 22-hour program, slated to begin last week, the 707 should attain speeds closer to the speed of sound than reached by any transport.

Other characteristics to be investigated by the 707:

- Emergency descent at the greatest speed possible. The descent rate is expected to exceed four miles a minute with air brakes and landing gear extended for maximum drag.
- High gross weight tests, including pull ups with sufficient force to subject the structure to 80% of the design limit G load.
- Rudder effectiveness evaluation.
- Shutdowns of one or more of the four Pratt & Whitney Aircraft JT-3 turbojets to determine the lowest speeds that the 707 can be controlled safely under these conditions.
- Stall tests at extreme center-of-gravity limits. Stability and control characteristics will be investigated throughout the C.G. range.

During all of its trials, the cabin air-conditioning and pressurization systems will be operated.

The 707 has been fitted with a drag chute to test effectiveness of the device. Several minor modifications have been made to the hydraulic brake system.

Great Circle Bid

- **PAA steps up campaign on strength of DC-7Cs.**
- **Observers report route 'sale' talks with NWA.**

Pan American World Airways is stepping up its year-old campaign for a Great Circle route across the Pacific on the strength of new long-range DC-7Cs, capable of flying nonstop from Seattle to Tokyo.

PAA now operates from San Francisco to Tokyo, with stops at Honolulu and Wake Island.

▶ **'Obsolete Provision'**—"With the new Douglas DC-7C airplanes now on order by PAA for 1956 delivery (AVIATION WEEK July 26, p. 17), we can fly the Pacific nonstop between Japan and the United States West Coast on a regular basis by using the short 'Great Circle' course," says Col. Clarence M. Young, executive vice president of the airline's Pacific-Alaska Division.

"Our plans await only delivery of the airplanes and action by the Civil Aeronautics Board and the President on our pending application for removal of the obsolete provision in our certificate requiring PAA to stop at a mid-Pacific island on its way to the Orient."

▶ **NWA Talks**—Pan American asked the Board last year for rights to the trans-Pacific Great Circle route, held at the present time only by Northwest Orient Airlines.

Industry observers report the airline also discussed with an NWA group several weeks ago the possibility of operating NWA's route under some type of agreement or buying Northwest's certificate to the coveted route, now up for renewal for seven years and backed by a CAB examiner (AVIATION WEEK Aug. 9, p. 48).

One group in Northwest has been reported as favoring sale or other disposal of its Great Circle rights, the observers say; but another faction is said to favor keeping the route and developing its traffic potential to a greater degree.

▶ **50% Time Cut**—Pan American says its 15-plane DC-7C fleet could clip trans-Pacific travel time more than 50% if allowed to fly out of Seattle across the 4,770-mi. northern route to Tokyo.

PAA's present route from San Francisco to Honolulu, Wake Island and Tokyo is 6,688 mi.

"Three-quarters of our passengers don't have any interest in stopping at Honolulu or Wake," one company spokesman says. "With the 5,222-mi. range and 365-mph. cruising speed of the DC-7C, we could be the first to negotiate the Pacific nonstop both ways."

Northwest stops at Anchorage on all trans-Pacific flights between Seattle and Tokyo.

▶ **12-Hour Hop**—Executive vice president Young says PAA would use Seattle as an exit and entry point on nonstop flights, with service continuing to and from San Francisco and Los Angeles.

Eastbound flights could make the trans-Pacific hop in a matter of 12½ hr. during seasons when the DC-7C would be able to ride the high-altitude jet stream winds, he adds.

Westbound service on the same route could be operated nonstop 90% of the year, with refueling stops in the Aleutians during the short period when adverse headwinds reach their peak.

"Progress demands this nonstop service to the Orient," Young claims. "And when the means are available, progress should be served.

"The fast growth of competition from foreign-flag airlines, both in the Pacific and elsewhere in the world, makes it a matter of national interest for the U.S. to maintain its leadership."

Project Vulcan: New Aircraft Weapon

An unusual 20-mm. aircraft weapon with an extremely high rate of fire and a new fighter gunsight system, the K19, are being developed by the General Electric Co.

The company says the 20-mm. firing mechanism, code-named Project Vulcan, has a rate of fire that surpasses the description of "fantastically high."

The K19 does the same kind of a job as contemporary sights but with fewer parts and for less weight, the company adds.

Developmental testing of both items has been done at the USAF Air Research and Development Command's Air Force Armament Center, Eglin AFB, Florida.

Vulcan uses a mechanism different from that of the recently announced M39 20-mm. cannon, which features a revolving magazine. Technical observers speculate that Vulcan uses a revolving multi-barrel assembly, similar in principle to the famed Gatling gun of the Civil War.

The phrase "fantastically high" has been used to describe the firing rate of the Ford-Pontiac M39 cannon, said to have a considerably higher cyclic rate than the 1,200 rounds per minute of the standard Browning .50-cal. aircraft machine gun. The Oerlikon 206 RK cannon, also built around a revolving magazine, shows a cyclic rate as high as 1,800 rounds per minute, according to Oerlikon.

The K19 is a component of a system that includes the aircraft autopilot, computing elements and the gunsight itself.

In a lead pursuit approach, standard attack for day fighters and the basic attack considered in the K19 design, the computer gives the pilot visual information that allows him to lead the target by the proper amount. An interlock prevents firing until the target is within range.

In a lead collision approach, favored by night fighters, the pilot centers the target in his sight. Then sight, autopilot and radar go into action and fly the plane on the computed course. Firing is done automatically at the correct range by the sight system, which then breaks off the attack to avoid collision.

Air Industry Spends $7,044 for Lobbying

Aviation representatives filed reports under the congressional lobbying act showing expenditures of $7,044 during the second quarter of 1954.

The largest aviation expenditure was reported by Aircraft Industries Assn., listing $5,046 and receipts of the same amount.

This figure compared with $67,632 in expenditures and an equal amount of receipts for the Association of American Railroads.

Harold Mosier filed a separate report as an AIA representative, listing an expenditure of $611 and receipts of $3,750.

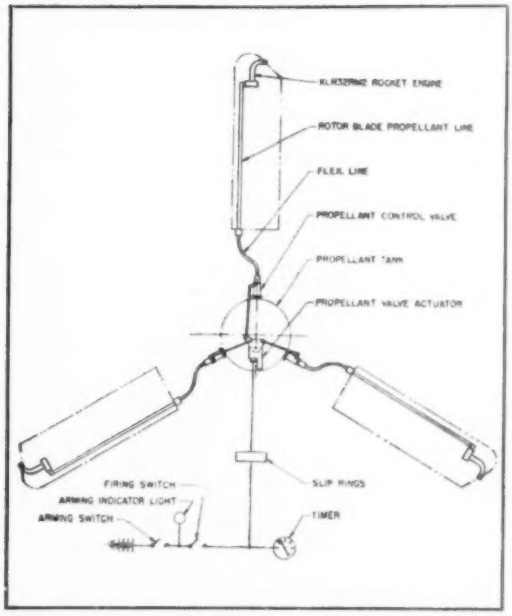
Air Transport Assn. did not report as an organization. Two ATA representatives reported: Stanley Gewirtz, $51 expenditure, no receipts listed; Edward Rodgers, $451 expenditure and receipts of $1,250.

These airline representatives also reported: William Huff, Trans World Airlines, $284 expenditure and receipts of $2,319; Dwight Taylor, American Airlines, $152 expenditure and receipts of $1,150; Donald Nyrop, Conference of Local Airlines, $449 expenditure and receipts of the same amount; John C. Cone, Pan American World Airways, no expenditure or receipts listed.

Other aviation representatives were: Larry Cates, Air Line Pilots Assn., receipts of $2,372, no expenditure listed; Wayne Weishaar, Aeronautical Training Society, 68 cents expenditure and receipts of $3,300.

Tiny New Rocket Engines Boost Payload For Copters

HYDROGEN PEROXIDE FUEL is pumped into tank mounted atop rotor head of Marine Corps Sikorsky HRS-2. In tests, rocket-on-rotor-equipped (ROR) HRS-2 lifted 650 lb. more load than the conventionally powered HRS. ROR was developed by Reaction Motors, Inc.



SCHEMATIC of Reaction Motors' ROR system for HRS-2. This type weighs only 67 lb. dry, carries enough fuel for seven minutes operation. To start, pilot presses a button. In use, the rocket engine is barely audible.

FUEL TANK is simple installation. Together with rotor-mounted power units, it can be adapted to many existing copters with relatively little alteration. Comparable increase in power by installation of a larger piston engine would mean an additional 200 lb. in powerplant weight alone, it is estimated.

ROCKET ENGINE at rotor blade tip weighs about one pound. Tests have covered over 1,000 starts and stops.

FAIRING covers rocket engine. Safe margin of control is possible even if one of the three units is cut off. ROR is also useful if piston engine quits.

SEC Reports Aircraft Industry Stock Sales

Roger Kyes, former Deputy Secretary of Defense and now a director of General Motors Corp., has purchased 1,000 shares of GM common stock, Securities & Exchange Commission reports.

This brought Kyes' holding to 1,500 common shares (AVIATION WEEK Aug. 23, p. 18).

SEC also reports that Glenn L. Martin, director of Glenn L. Martin Co., sold 3,987 common shares, reducing his holding to 275,100. Jess Sweetser, officer, acquired 1,000 Martin shares, making a total holding of 3,000.

Other transactions for the mid-July to mid-August period:

Aero Supply Manufacturing Co. Acquisition of 2,500 capital shares by William Coleman, officer, making a total holding of 19,885; purchase of 1,000 capital shares by K. R. Benson, director, making a total holding of 5,000.

Air Reduction Co. Acquisition of 100 common shares by George Hawkins, director, making a total holding of 850; acquisition of 200 common shares by Keith McHugh, director, making a total holding of 300.

Allegheny Airlines. Purchase of 400 common shares by Leslie Barnes, officer and director, making a total holding of 20,800; acquisition of 4,500 common shares by H. A. Satterwhite, director, making a total holding of 9,900.

American Airlines. Acquisition of 1,000 common shares by William Hogan, officer, his total holding.

Aro Equipment Corp. Acquisition of 600 capital shares by Ralph McConnell, director, making a total holding of 9,096.

Atlas Corp. Disposal of 3,000 common shares and option for 2,531 common shares by L. Boyd Hatch, director, leaving a holding of 846.

Bendix Aviation Corp. Purchase of 435 common shares by Marvin Heidt, officer, making a total holding of 537; acquisition of 499 common shares by L. A. Hyland, officer, making a total holding of 599; purchase of 535 common shares by Palmer Nicholls, officer, making a total holding of 589.

Braniff Airways. Acquisition of 1,000 common shares by Charles Beard, officer and director, making a total holding of 2,100; sale of 1,000 common shares by Thomas Ryan III, director, leaving a holding of 43,000.

Emerson Electric Manufacturing Co. Purchase of 2,000 common shares by Elton Investment Corp., making a total holding of 73,000.

Flying Tiger Line. Sale of 2,000 common shares and acquisition of debentures valued at $8,000 by Robert Prescott, president, making a total holding of 1,228 common shares and $130,000 in debentures; disposal of $3,000 debentures by James Davidson, director, leaving a holding of $87,000 debentures.

General Electric Co. Purchase of 4,500 common shares and sale of 800 shares by Ralph Cordiner, officer, leaving a holding of 6,100; acquisition of 600 common shares by F. E. Fairman, making a holding of 900; acquisition of 987 common shares by Orvill Haas, making a holding of 1,308; purchase of 1,600 common shares by William Rogers Herod, officer, making a holding of 5,800; acquisition of 200 common shares by Francis Higginson, director, making a holding of 1,000; sale of 175 common shares by W. V. O'Brien, leaving a holding of 100.

Lear, Inc. Disposal of 308 common shares, total holding, by Frederick Harrison.

Lockheed Aircraft Corp. Sale of 1,542 capital shares by Burt Monesmith, officer, leaving a holding of 1,000.

McDonnell Aircraft Corp. Disposal of 1,000 common shares by Garrett Covington, leaving a holding of 950.

Minneapolis-Honeywell Regulator Co. Disposal of 250 common shares by C. B. Sweatt, officer and director, leaving a holding of 11,255.

National Aviation Corp. Sale of 500 common shares by Elmer Wellin, director, leaving a holding of 5,700.

Pan American World Airways. Disposal of 3,000 common shares by H. M. Bixby, officer and director, leaving a holding of 7,000; acquisition of 100 common shares by Robert Fleming, director, making a holding of 200; sale of 300 common shares by Harold Gray, officer, leaving a holding of 2,048; purchase of 1,000 common shares by Robert Hamill, director, making a total holding of 2,000.

Republic Aviation Corp. Sale of 300 common shares by Thomas Davis, officer, leaving a holding of 1,020.

Ryan Aeronautical Co. Purchase of 100 common shares by Emtor, Inc., making a total holding of 86,400.

Seaboard & Western Airlines. Disposal of 500 common shares by Douglas Amann, director, leaving a holding of 7,530; sale of 2,300 common shares by Carl Brell, officer, leaving a holding of 28,525; disposal of 500 jointly held common shares by Wallace Neth, director, leaving 426 individually held and 29,049 jointly held shares; disposal of 2,000 common shares by Arthur Norden, director, leaving 28,621; sale of 2,200 common shares by Raymond Norden, director, leaving 31,437; disposal of 900 common shares by John Rosenwald, officer, leaving 51,675.

United Aircraft Corp. Disposal of 600 common shares by H. Mansfield Horner, director, leaving a holding of 4,200.

F-100 Contract

North American Aviation has won an additional Air Force contract of more than $100 million for F-100 Super Sabre jet fighters.

The planes will be built at the company's plant in Columbus, Ohio.

First source of the F-100 will continue to be North American's home factory in Los Angeles, where deliveries now are being made. Output of the Columbus plant will begin in about a year, following a tooling program to be started at once.

The Super Sabre, powered by a Pratt & Whitney Aircraft J57-7 engine, is USAF's first operational supersonic plane.

New Titanium Plant To Boost U.S. Output

Construction of a $31.5-million titanium production plant by Electro Metallurgical Co., a division of Union Carbide & Carbon Corp., will boost planned ingot capacity by 7,500 tons annually to a total of 22,500 tons.

Under a contract with General Services Administration, the government has guaranteed to purchase up to 6,000 tons annually of the output of the Electro-Met facility for a period of five years. The firm will use its own funds for design, construction and equipping.

Upon one year's notice the government may cancel the guaranteed purchase agreement by paying the company an amount equal to the unamortized cost of the plant.

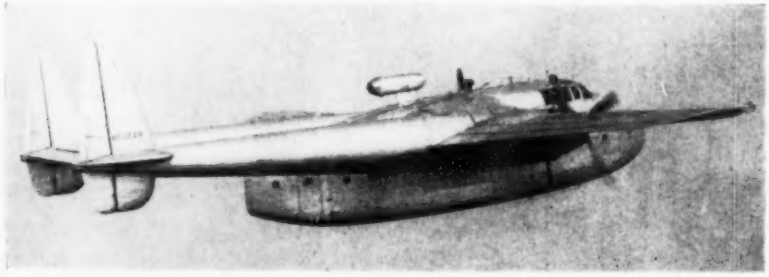
The facility, largest planned to date, is scheduled for operation in two years.

Government contracts to increase titanium ingot capacity already in effect are: du Pont de Nemours Co., 2,700 tons annually; Titanium Metals Corp., 3,600 tons; Cramet, Inc., 6,000 tons; Dow Chemical Co., 1,800 tons.

Du Pont also is producing 900 tons a year independent of government support.

$50 Million for Fuel

A $50-million contract covering fuel and allied petroleum supplies over the next four years has been signed by United Air Lines and Standard Oil Co. of California. Destined for the carrier's West Coast needs, the contract amounts to 45% of UAL's total requirements.



Fairchild Tests Jet Assist for Transports

To determine the value of jet assistance in increasing takeoff loads and rate of climb, Fairchild Engine & Airplane Corp.'s Aircraft Division, Hagerstown, Md., is testing a C-82 with a Fairchild J44 turbojet atop the fuselage between the piston engines. The J44 gives an added 1,000 lb. thrust on takeoff. It is expected that the combination will allow increases in maximum takeoff weights up to two or three tons. Single or multiple J44 packages can be mounted on the top, bottom or sides of fuselages or at the wingtip, Fairchild says. The C-82, leased from USAF for these tests, bears a civil registration on wings and tail instead of the Packet's normal military markings.

AIR FORCE SMALL BUSINESS PROGRAM
BASIC ACTIVE PROGRAMS
14 MAJOR AIR FORCE PURCHASING LOCATIONS
CONTRACT PLACEMENT
EACH HAS AN AIR FORCE SMALL BUSINESS SPECIALIST
ALSO 153 BASES HANDLING LOCAL PURCHASES
LARGE BUSINESS PRIME CONTRACTORS
APPROXIMATELY 850
EACH HAS ITS OWN SMALL BUSINESS LIAISON OFFICER
35 LARGEST HAVE AIR FORCE
PLANT REPRESENTATIVES
24 AIR FORCE DISTRICT OFFICES AND SUB-OFFICES
PROCUREMENT INFORMATION
AND
SUB-CONTRACTING ASSISTANCE
EACH HAS AN AIR FORCE SMALL BUSINESS SPECIALIST
SMALL BUSINESS CONCERNS
PRIME CONTRACTORS-SUBCONTRACTORS
ACTUAL AND POTENTIAL

Trends in Subcontracting—First in a Series

Small Firms Get Bigger AF Slice

By Claude Witze

In the fight for a slice of fiscal 1954's Air Force melon, small business licked big business by a wide margin compared with fiscal 1953.

While the prime contract melon was not as large as it was in fiscal 1953, by percentage small business received twice as big a portion as it had last year.

In 1953, Air Materiel Command bought $14,210,598,000 worth of goods. That was for everything, from bombers to paper clips. Small business obtained 4.3% of the orders, big business 95.7%.

▶**Double Percentage**—In fiscal 1954, AMC spent only $5,693,683,000, but small business pushed its portion up to 9.8% of the total. Big business saw its share drop to 90.2%.

In dollars, small business suffered a decline of $52,063,000 in prime contracts, but big business took a walloping slash of $8,464,852,000.

Major participation of small business in providing goods for USAF still lies in the field of serving as a subcontractor and supplier to major prime contractors, who take the basic responsibility of providing weapon systems.

In fiscal 1954, this meant sales of $1,078,763,000 to small businesses, down more than $1.5 billion from last year.

▶**Stemming Pullbacks**—Concern over this cut, not unexpected, has led AMC to call a series of meetings of major prime contractors in an effort to stem the trend of weapons system contractors to pull component manufacture back into their own plants.

The first session was held in July on the West Coast. A second is scheduled for Sept. 28 in Chicago and a third for New York in October (AVIATION WEEK Sept. 6, p. 18).

USAF Procurement and Small Business

	FY 1952	FY 1953	FY 1954
Total procurement from industry	$11,928,495,000	$14,210,598,000	$5,693,683,000
Small business potential	1,263,701,000	837,156,000	733,086,000
Percentage of total	10.5	5.9	12.9
Small business awards	695,091,000	608,778,000	556,715,000
Percentage of total	5.8	4.3	9.8
Percentage of potential	55	73	76
Small business participation as subcontractor and supplier	2,359,015,000	2,856,382,000	1,078,763,000
Total small business participation in total USAF dollars spent	3,054,106,000	3,465,160,000	1,635,478,000
Percent of USAF dollars to small business	25	25	29

At these meetings, Brig. Gen. Thomas P. Gerrity, director of procurement and production engineering at USAF Headquarters, will make it clear that Air Force policy calls for the maintenance of subcontracting facilities by spreading production contracts wherever economically feasible.

▶**Declining Market**—AMC makes no secret of the fact that the potential market for small business products has been dropping steadily in the past three years. The Small Business Office takes just credit for what comes of its struggle to give firms with fewer than 500 employes from 25 to 33 cents out of every dollar USAF spends.

But when small business representatives see the total outlay decline and, more important, a cut in the number of items small business is capable of providing, the fastest possible result is a complaint—usually to a senator or representative.

▶**Specialized Field**—Max Golden, deputy for procurement and production in the Office of the Secretary of the Air Force, is the man who usually has to answer the questions. He points out first that USAF does not buy the general line of commercial items usually made by small business.

"Our requirements for such items," Golden told a Senate committee recently, "are purchased for us by the Army and Navy or from schedules established by the General Services Administration.

"Our field is the highly specialized one of procurement of aeronautical equipment and related items, which are rapidly becoming more complex. The type of equipment in a B-29 in World War II required a crew of 11. . . . Today the B-47 carries a crew of three, yet is larger, faster and more destructive . . . .

"We must face up to the fact that the intricate electronic control systems which make this possible have replaced many items of equipment formerly made by small concerns. . . ."

▶**'Healthy Situation'**—Golden went on to say that, in addition to the small business firms working as subcontractors to large prime contractors, USAF has more than 2,000 such companies working on prime contracts.

"This is a healthy situation and one which we wish could continue," he said. "Realistically, however, we doubt that it can. Today we are at our peak; over the next two years our volume will decline and level off at about half the present monthly rate. . . .

"We intend to see to it that small business gets its share, but we must make it clear that it will be a share in something approximating half its present volume."

▶**Explanation**—Once this is thoroughly understood, USAF is ready to face the

incisive questions of a congressional committee with a three-year record worth bragging about.

During World War II, small business got 4.5% of the prime contract dollars paid out by AMC. For 1954, the figure was 9.8%. In 1953 it was 4.3% and in 1952 5.8%.

The low 1953 figure for percentage of all contracts is easily misinterpreted and every AMC small business specialist is quick to furnish an explanation. The reason: A large share of fiscal 1953's huge outlay of $14,210,598,000 went for weapon systems and major components that cannot be made by most small businesses as prime contractors.

▶ **'Potential' Yardstick**—AMC spokesmen are careful to measure success of their small business effort against the "small business potential" and not against the total dollars spent in a fiscal year.

Here is USAF's explanation of why the largest dollar volume of its purchases come of necessity from large corporations:

There are about 2,800 prime contractors selling goods to AMC. Some 2,000 are small businesses, employing fewer than 500 persons. Of the 800 others, 35 are so big and so important in the weapon system procurement picture that AMC keeps plant representatives and staffs in the plants at all times.

These companies take responsibility for the development, design and production of fighters and bombers. Their contracts total approximately 80% of the procurement dollars spent by AMC. The contracts are not considered part of the "small business potential" because no company with 500 or fewer employes could do the job.

"The only measure of a program that has validity is to relate the dollars awarded small business to the amount they could possibly get," says Kennard Weddell, chief of the Office of Small Business at USAF Headquarters.

On this basis, Weddell reports that of contracts small business is capable of handling, it received 55% in 1952, 73% in 1953 and 76% in fiscal 1954.

▶ **Fertile Soil**—Best source of business for small firms lies in the field of subcontracting to some of the 800 large businesses that hold prime contracts, and the most fertile soil in this field is among the 35 companies producing weapon systems or major systems.

To utilize every possible small business source, each one of the large business prime contractors is required to name one of his own top-staff officials as small business liaison officer. This has resulted, according to Weddell, in small business programs in most large prime contractors.

▶ **Operation Pacemaker**—Second major USAF activity is Operation Pacemaker, a campaign to increase the number of prime Air Force contracts with small business.

Prime responsibility for Operation Pacemaker is held by the small business specialists at each of AMC's 14 major purchasing offices. In addition, the drive is keyed to the demands of 153 USAF bases where housekeeping items are bought from local manufacturers and merchants.

AMC says every procurement, except those that are classified or for less than $10,000, is screened. If the record shows an item ever was bought from a small business or that a small business ever tried to sell it to AMC or if publicity produces a bidder, small business gets a fair chance to sell.

Operation Pacemaker has figures to prove its own effectiveness. While they reflect the changing nature of AMC's purchases and the fact that airplanes are growing more complex and more remote to the small businessman, they also show that his percentage of the potential of prime contracts has increased 20% in three years.

Dollar value of the potential declined $91,879,000 between fiscal years 1952 and 1954. But the percentage of the prime contract small business potential awarded to small business jumped in these years from 59.9 to 79.9% in Operation Pacemaker.

▶ **Important Contract**—Third program carried out by AMC to utilize small business capacity is that effected by small business specialists in 24 district and subdistrict offices.

"These offices," Weddell says, "are the most important point of contact for the small business man who wants to be a prime or subcontractor for USAF requirements."

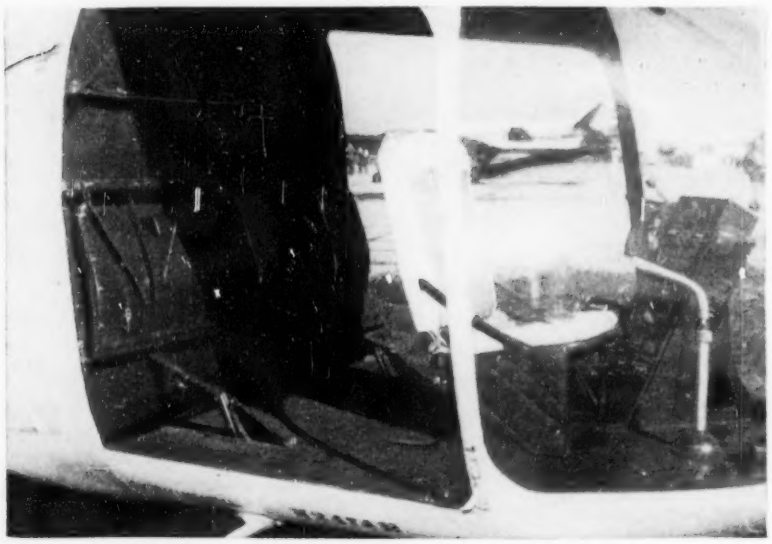
Here is what they do:

- Maintain close contact with large prime contractors and always are ready to pass along information on subcontracting opportunities.
- Maintain facility records of small businesses for large prime contractors on the hunt for new sources.
- Act as liaison between AMC and small business whenever the opportunity arises for placement of a prime contract.
- Maintain bid sets and drawings and specifications on pending procurements in the 14 major AMC purchasing offices as well as the local buying being done by nearby USAF bases.

▶ **Facts of Life**—In a boom year for USAF-small business relations, such as fiscal 1953, 33% of the money spent by AMC found its way to small production plants.

To keep the percentage high, Weddell says, small business must face up to two big facts of life:

- It must keep prices in line. AMC will not pay a premium just to get the item from a small business concern.
- AMC is forced to keep some large production sources in operation because of their value to America in case of an emergency.



Inside Bell's New Four-Place 47G-1

Cabin of Bell's new 47G-1 four-placer has three side-by-side passenger seats folded upward against the rear wall for conversion to an ambulance helicopter. A stool for a medical attendant can be fitted next to the pilot. Note how the pilot's instrument panel is tilted and offset to his left to give him optimum forward visibility. New 47G-1 was shown recently at Wright Patterson AFB (Aviation Week Sept. 13, p. 17). Bell has been demonstrating the copter at several military bases in the United States.

Geared For Government Production Exclusively

Rheem's integrated plant facilities are completely equipped to handle every phase of research . . . engineering . . . and production. Present projects include the production of air frames, missile components, jet engine components, airborne ordnance and electronics.

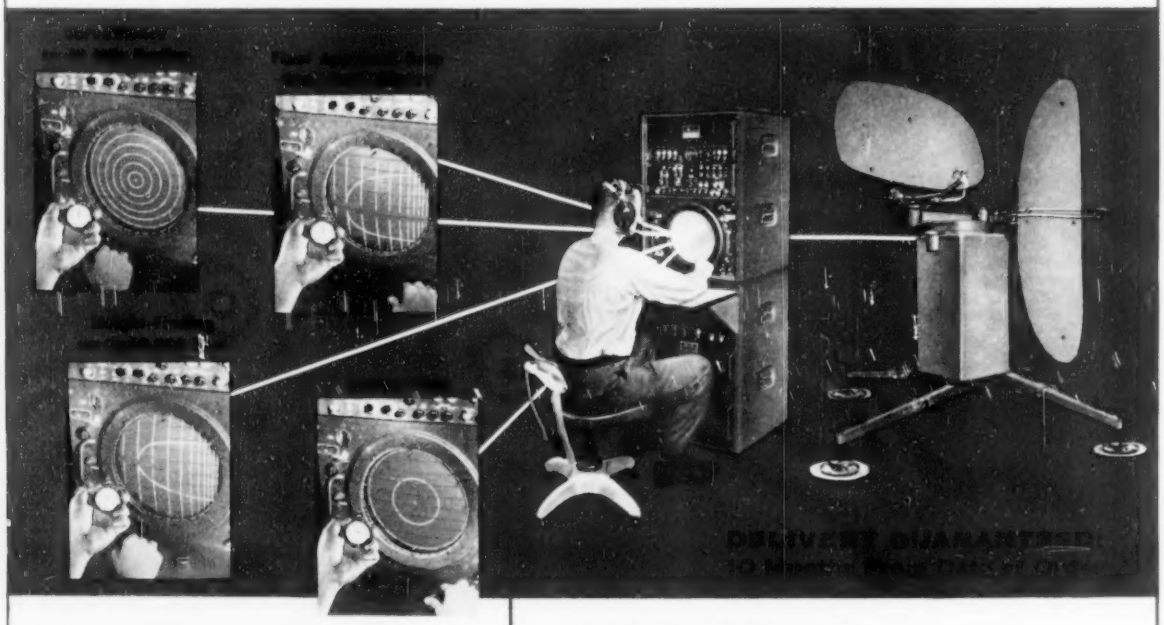
These outstanding facilities cover nearly one-half million square feet of floor space on 50 acres of ground. They constitute a major industrial investment in national security . . . and are at your disposal. Write, wire or phone for full details.

RHEEM Manufacturing Company...Government Products Division, Downey, California

Which do you prefer– at no additional cost?

4 RADAR FUNCTIONS...OR 1

ONLY The Gilfillan GCA Quadradar Provides All 4 Radar Traffic Control Functions



Gilfillan
LOS ANGELES

SEND FOR BROCHURE

Please specify: Gilfillan GCA Quadradar-M (Military Equipment)
Gilfillan GCA Quadradar-C (Civil Airport)

Address: Gilfillan Brothers, Dept. AW-94, 1815 Venice Boulevard
Los Angeles, California

An Appraisal of the Nation's Airpower Program

By Sen. Leverett Saltonstall

Mr. President: Recent events in the Far East underscore the necessity for steady nerves and the long view if the United States is to maintain effectively its position as leader of the free world. Fundamental to our ability to adopt such an attitude and to hold it with firmness and confidence is public understanding of where we are and whither we are going. In no field is this more true than that of our national defense. Within that field, public understanding is nowhere more important than with respect to the rate and direction of build-up of the nation's airpower program.

Now that the Defense Department appropriation bill for the fiscal year 1955 has been enacted into law, I believe the time opportune for a calm and objective appraisal of the present status and future prospects of that program.

Just about a year ago, in connection with the Senate debate on the fiscal year 1954 Defense Department Appropriation Bill, I took the floor to present my views on the Administration's air program. There had been much public discussion at that time of the difference between the Air Force budget proposed by President Truman and that proposed by President Eisenhower. Now, a year later, although criticism of the Administration's air program appears to have subsided, major differences in viewpoint still exist.

Last year I said, "Let me first state just as emphatically as I can state it that I am first and foremost for a strong air force, an air force both offensively and defensively that can protect and maintain our national security." Events of the last year have strengthened this conviction. That is why I welcome informed public discussion of the nation's airpower policies. That is why I have listened very carefully and attentively to the remarks of my colleagues in the Senate on this subject, and to the testimony of Defense Department officials before the Senate Armed Services Committee and the Senate Appropriations Committee.

At no time in the history of this country has the problem of military policy been of more direct concern to the average citizen than it is now. All of us, both individually and collectively, have a very vital stake in the successful solution of this policy problem. This is the time for calm and objective discussion, for clear thinking and for considered judgment. Partisanship in national defense should always be avoided. Partisanship is not my purpose in these remarks.

AIRPOWER'S 'NEW LOOK'

The most important element in national defense at this time is airpower. This has been recognized by both military and civilian leaders concerned with our national security. President Eisenhower, in his message transmitting the fiscal year 1955 budget to the Congress, stated very clearly that this budget "points toward the creation, maintenance, and full exploitation of modern airpower. Our military planners and those of the other nations of the free world agree as to the importance of airpower."

Admiral Radford, Chairman of the Joint Chiefs of Staff, said in his statement explaining the new look, "Today there is no argument among military planners as to the importance of airpower. Offensively, defensively, and in support of other forces, it is a primary requirement. Its strength continues to grow, both through increases in combat air units and through better equipment."

I do not believe there is any real disagreement in this country as to our airpower objectives. The differences between the proponents and opponents of the Administration's air program appear to lie in the manner in which it is proposed to attain these objectives.

Last year the basic difference was how much money should be appropriated for fiscal year 1954 to meet the needs of the program, based on how much money could wisely be placed under contract. The ultimate size of the Air Force was not the issue, since the 120-wing program was specifically stated to be an interim goal pending a reappraisal of the entire military situation by the newly appointed Joint Chiefs of Staff.

This reappraisal was completed in December of 1953 and the new airpower goals unanimously recommended by the Joint Chiefs of Staff were incorporated in the fiscal year 1955 budget. What are these new airpower goals and how well do they provide for the defense of the United States and for our role in the collective defense of the free world?

MARINE, NAVY ROLES

The new airpower program provides for a steady build-up of the Air Force to 137 wings by June 30, 1957, together with necessary support units both flying and nonflying. It also provides for the continued modernization of our 16 Navy carrier air groups, 15 Navy carrier antisubmarine warfare squadrons, 34 patrol aircraft squadrons, 4 airship and 4 helicopter antisubmarine warfare squadrons, and 3 Marine air wings, together with their appropriate support elements. It further provides for the continued rebuilding of the reserve components of all three of these elements of our airpower.

All too often in the discussion of national airpower, Naval and Marine aviation are overlooked and ignored, yet in terms of active aircraft our Naval and Marine aviation represent more than one-third of our total air power. Many people would be surprised to learn that as late as June 30, 1953, Naval and Marine aviation operated about the same number of fighter-type aircraft as the Air Force.

Admiral Radford in his statement before the Senate Appropriations Committee on Mar. 15, put the matter very well when he said, "Some people do not fully comprehend the true magnitude of today's United States national airpower, and I would like to state unequivocally that it is

Vital Airpower Document

Aviation Week continues its series today on the new U. S. Air Force with the complete text of the recent address by Sen. Leverett Saltonstall on Capitol Hill. It is described in Washington government and military circles as equivalent to a "white paper" enunciating the Eisenhower Administration's airpower policy now in effect. It is known that the highest Administration and military aviation officials collaborated with Sen. Saltonstall in this official policy and progress report. The address, delivered July 28, is the most important formal statement on U. S. airpower policy since Admiral Radford, chairman of the Joint Chiefs of Staff, announced the so-called "New Look." Sen. Saltonstall is chairman of the Senate Armed Services Committee. We believe it is important for our readers to be familiar with such vital and official statements, in order to understand better the week-to-week developments in military aviation news.

—RHW

superior to that of any other nation. Furthermore, the United States has so developed certain segments of its airpower as to achieve a strategic air force and a naval carrier striking force which are without peer in this world."

In all, the new air program provides for a total of almost 40,000 Air Force and Navy active aircraft, an increase of approximately 6,000 over the number on hand at this time. The new program also provides for the continued modernization of this aircraft inventory so that by the end of fiscal year 1957 the entire force will have reached a very high level of modernization.

The new air program also places increased emphasis on continental defense. In this connection there appears to be some misunderstanding as to the nature of the 137-wing Air Force program. I have heard it said that in terms of combat wings this program is just the same as the earlier 143-wing program. This is not the case. The number of combat wings is the same, but the composition of the force has been significantly altered. The number of air defense wings has been substantially increased in the new program, and the capabilities of our bomber and tactical wings vastly increased by availabilities of new weapons.

STEADY BUILD-UP

The increased emphasis on air defense does not end with this increase in the number of air defense wings. Major improvements are being made, and will continue to be made, in our radar defense, on the ground, in the air, and at sea. Not only will the size and scope of our radar defense and early warning system be expanded but the quality and effectiveness of the equipment will be vastly improved as new devices are integrated into this system. All three of the Services have an important part in this vital mission.

As I have stated, the new air program provides for a steady increase in the size and capability of the Air Force. The rate of build-up is slower than that claimed but not achieved for the original 143-wing program, but it is a rate which is reasonably sure of attainment, one that can be accomplished without reducing the combat readiness of the force in the process, one that can be accomplished efficiently and economically, and one that will enable us to maintain a strong aircraft manufacturing industry.

The issue has been raised as to whether the proposed rate of build-up is fast enough in the light of the existing threat to our national security. This is a matter of military judgment. The completion date for the 137-wing Air Force was unanimously recommended by the Joint Chiefs of Staff and was approved by President Eisenhower. There are some persons with extensive experience in military affairs who nevertheless feel that the build-up is not fast enough; who feel that if necessary we should push the program on a crash basis regardless of cost, regardless of efficiency, and regardless of the effect on our mobilization base.

LONG-PULL CONCEPT

This difference in viewpoint is essentially the difference between the long-pull concept and the former D-Day or "year of crisis" concept. The Joint Chiefs of Staff, the National Security Council and the President have decided to gear the military program for the long pull. Since it is impossible to forecast precisely the year and the amount of maximum military danger, it was decided to provide a sturdy military posture which could be maintained indefinitely over an extended period of cold war. As I have said, this this is a matter of military judgment, and having heard the arguments pro and con, I take my position with the Joint Chiefs of Staff, the National Security Council and the President.

Aside from the question of military judgment, the long-pull concept appears to me to have great advantages over the year-of-crisis concept represented by the original 143-wing Air Force program. It is not generally realized how big and how rapid a build-up the original 143-wing program called for.

The program presented to the Congress in January and February 1952 called for the activation, manning, basing and equipping of 96 combat wings by June 30, 1953; 120 combat wings by June 30, 1954; and the full 126 combat wings by June 30, 1955. These combat wings comprise the bomber, fighter and combat reconnaissance elements of the Air Force. The 143-wing program, of course, also included 17 troop carrier wings. All 126 combat wings were to be fully manned, equipped and properly based by June 30, 1955, and fully modernized by Dec. 31, 1955. During the same period of time the Air Force was to have rebuilt its reserve forces from practically nothing to a total of 57 wings plus a variety of support units.

In the very first year of the program, the Air Force build-up fell short by six combat wings. Instead of 96 combat wings, the Air Force had only 90; and of these, eight were reported as having a very low degree of combat capability because of extreme shortages of aircraft, other equipment, personnel and/or facilities.

When the Air Force came before the Congress last year, the 143-wing program reflected in the Truman budget had already been slowed down. Instead of 120 combat wings by June 30, 1954, the revised program called for 116. The Air Force had already recognized by the time that it could not meet the original build-up schedule and had cut the June 30, 1954, goal by four combat wings.

But this left a total of 26 new combat wings to be activated, manned, equipped and based in fiscal year 1954; plus some 20-odd combat wings of the existing 90 to be converted to new equipment and the manning and equipping of the eight combat wings carried over from fiscal year 1953 to be completed. In addition, the rebuilding of the Air Force Reserve and the Air National Guard was to be continued at an accelerated rate.

It is difficult for the layman to grasp the magnitude of the task represented by these few simple numbers and facts. In an effort to provide some basis for comparison, it may be useful to review briefly the actual experience of the Air Force during the fiscal years 1951 through 1953.

KOREAN INFLUENCE

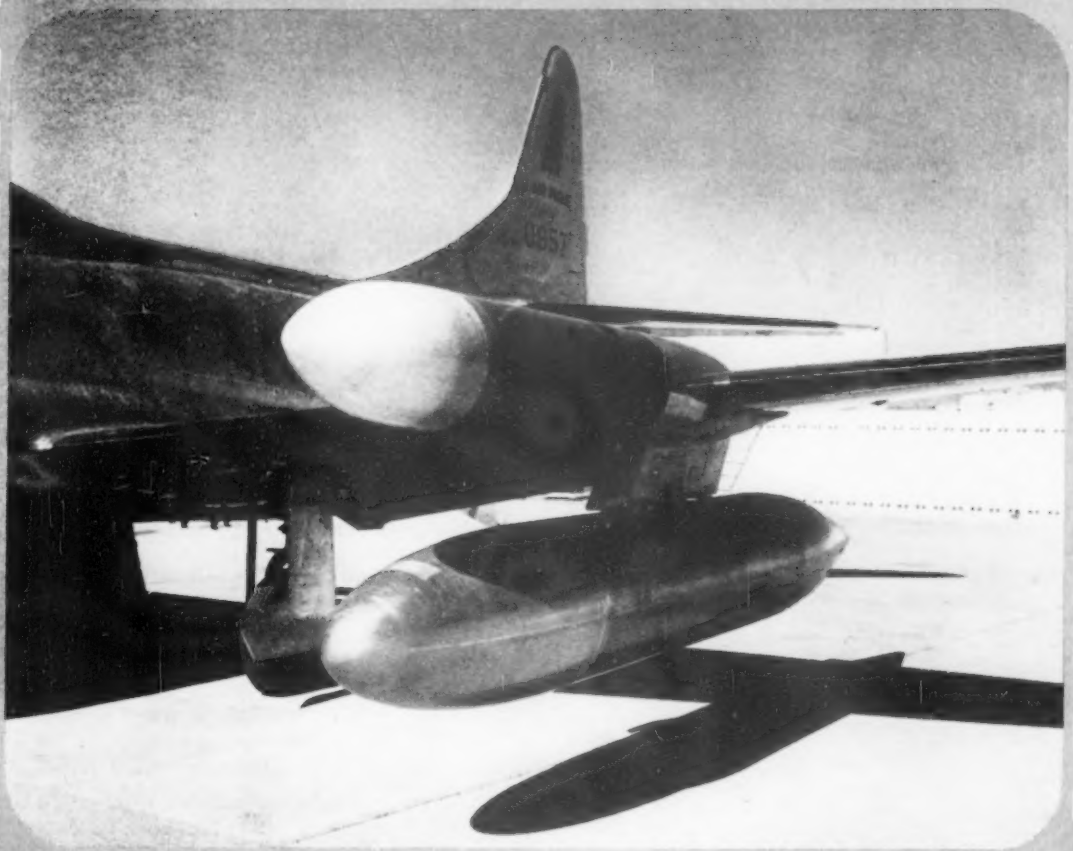
The Air Force had in being on June 30, 1950, 42 operational combat wings in the regular Air Force and 32 combat wings in the Air National Guard and the Air Reserve. One year later, the regular Air Force had 72 combat wings in being and the Air National Guard and Air Reserve only 5. In effect, the 30-wing build-up during fiscal year 1951 was almost completely at the expense of the reserve components.

The resources of the reserve units, both men and materiel, were absorbed by the regular Air Force and reflected in the 30-wing increase. But this was a one-time gain. The next year, fiscal year 1952, the Air Force gained only 8 combat wings, and in fiscal year 1953, the third year of the Korean build-up, it gained only 10 more, making a total of 90 combat wings on June 30, 1953. Of these 90, as I have said before, 8 had little or no combat capability.

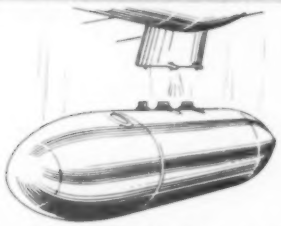
It may be argued that the Air Force during the entire three-year period was engaged in active combat operations in Korea. This no doubt had some bearing on the slow rate of build-up during that period, but only to a limited degree. Combat losses of modern aircraft during the entire Korean war were quite nominal. The fact remains that a large part of the 126 combat wing build-up still remained to be accomplished at the beginning of fiscal year 1954.

One very important aspect often overlooked in the discussion of the original 143-wing Air Force program is the effect of the projected rapid build-up on the combat effectiveness of the force as a whole. The activation, manning, equipping and training of a new wing or the conversion of

LOCKHEED selects PASTUSHIN FORCE EJECTION for the F-94C Starfire



After extensive investigation and testing to determine reliability, Lockheed specified the force ejection mechanism and 230 gallon jettisonable fuel tank designed, developed and produced by Pastushin Aviation Corp. The Pastushin force ejection pylon-jettisonable fuel tank combination assures safe, positive ejection at any speed or possible flight attitude for the F-94C . . . or any airplane.



The compact Pastushin force ejection mechanism offers high firing power, high structural strength and a minimum of frontal area.

RESEARCH • DESIGN • DEVELOPMENT • PRODUCTION

PASTUSHIN

AVIATION CORP. Los Angeles, Calif.

Engineers: If you are not now employed in a defense industry, submit resume.

an existing wing to entirely new equipment requires a tremendous effort and a considerable period of time before the newly activated or newly converted wing is brought to a level of full combat effectiveness.

TRAINING PROBLEMS

It may not be generally realized that a new wing cannot be activated entirely with new people. A cadre of trained personnel must be detached from an existing wing to provide the nucleus around which the new wing can be organized, equipped and trained. The withdrawal of these trained cadres from existing wings unavoidably reduces the combat effectiveness of those wings. The wing from which the trained cadre is detached then requires a period of time to rebuild before it can regain full combat effectiveness.

We have been told by the Air Force that eight to 13 months are required, on the average, from the time a new wing is activated to the time when it achieves full combat readiness. It can readily be seen that the activation of 26 new wings in a single year, in itself, would have had a major effect on the combat effectiveness of the existing wings.

It is perhaps even less well known that the conversion of an existing wing such as a B-50 or a B-29 wing to radically new equipment such as the B-47 aircraft completely eliminates the combat effectiveness of that wing for a period of three to six months and that it requires six to nine months or longer for that wing to regain full combat readiness.

When the conversion is started, the wing has to be grounded. The mechanics are sent to the technical training command to be retrained to the new equipment. The engine mechanics obviously must undergo extensive retraining but so do the electronics personnel. The electronics system of the B-47 is much more extensive and complicated than that of the B-29 and B-50. I am relating this fact simply to provide some indication of the magnitude of the task involved.

At the same time, the air crews must also be retrained to fly the new airplane. The B-47 is radically different from the B-50 or B-29 and the familiarization training required is quite extensive. Then, too, the B-47 takes a much smaller crew than the reciprocating-engine medium bomber. This means that each of the three men in a B-47 crew must master a wider range of knowledge and skill. All of this takes time and during that time the wing being converted to new equipment has little or no combat effectiveness.

As the retrained personnel are brought together again with their new equipment, unit training is commenced. Several months of such training are required before the wing is again an operational and combat-effective unit.

It is entirely improbable that the Air Force could have activated, manned, equipped and trained 26 new combat wings and converted to entirely new equipment some 20-odd existing combat wings all in a single year. If the attempt had been made, it would have seriously reduced the over-all combat effectiveness of the Air Force.

The new 137-wing Air Force program minimizes this threat to the current readiness of the force. In terms of combat wings, the new program provides for a steady build-up of some 8 to 10 combat wings each year, fiscal years 1954 through 1957.

This is a rate of build-up which experience indicates is reasonably attainable without causing an imbalance in the Air Force program and without diluting the combat effectiveness of the existing force. This realistic rate of build-up will permit the Air Force to properly man, train, equip and base the new wings as they are activated, and to increase its combat effectiveness concurrently with the increase in number of wings.

QUALITY EMPHASIZED

Another distinct advantage of the new Air Force program over the old is that it places the emphasis on quality rather than mere quantity. The presently planned rate of build-up reduces the pressure for numbers. It reduces the pressure on the Air Force to accept equipment with less than the desired performance characteristics. It provides time for the orderly development, testing, production and integration into the force of the latest and most advanced types of equipment. It should do much to eliminate the endless rounds of modification of equipment after it is delivered to the Air Force and the extra costs and delays resulting therefrom.

Those of us in this chamber who have been intimately concerned with airpower problems and programs during the last three or four years will immediately recognize the value of the benefits promised by this new approach. For years we have been faced with disappointments, with slippages, production problems, delays, and with requests for more funds for projects the cost of which far exceeded the original estimates. We have appropriated literally billions of dollars over the last five years for engineering changes to equipment still in production and for modification of equipment already delivered to the services.

I do not say this simply in criticism of the past Administration. I am well aware that the situation today is quite different from what it was three or four years ago; that our military posture is now much stronger than it was in the summer of 1950. But I do want to say in the most emphatic manner possible, that the time was ripe for a drastic change in our approach to the problem of building our airpower.

Now that we have achieved national airpower which the Chairman of the Joint Chiefs of Staff states unequivocally "is superior to that of any other nation," there is no urgency to rush the completion of our planned build-up on a crash basis, regardless of the effect on the quality of our airpower.

ECONOMY, EFFICIENCY

This leads me to the third advantage of the new Air Force program as compared with the old. The rate of build-up projected in the 137-wing program should be attainable without extraordinary actions or improvizations. Economy and efficiency need no longer be sacrificed for speed. The Air Force can now conduct its affairs in an orderly businesslike manner with due consideration for costs. Program elements can be kept in balance—activations, aircraft deliveries, personnel procurement, personnel training, base construction, etc. Slippages in individual elements of the program can be absorbed without significant delay to the program as a whole.

The Air Force, in the last year, has been energetically putting its house in order, examining its inventories and disposing of those items which are obsolete or excess to its foreseeable needs, as are the Army and Navy. This task is long overdue.

In the procurement area, the Air Force can now do its contracting on a businesslike basis. Negotiations can be completed before contracts are let and monies obligated. This should enable Air Force buyers to obtain better deals for the Government. It will also assure that all the terms of the contract are worked out before the Government is obligated, and specifications are available before contracts are signed and production is started.

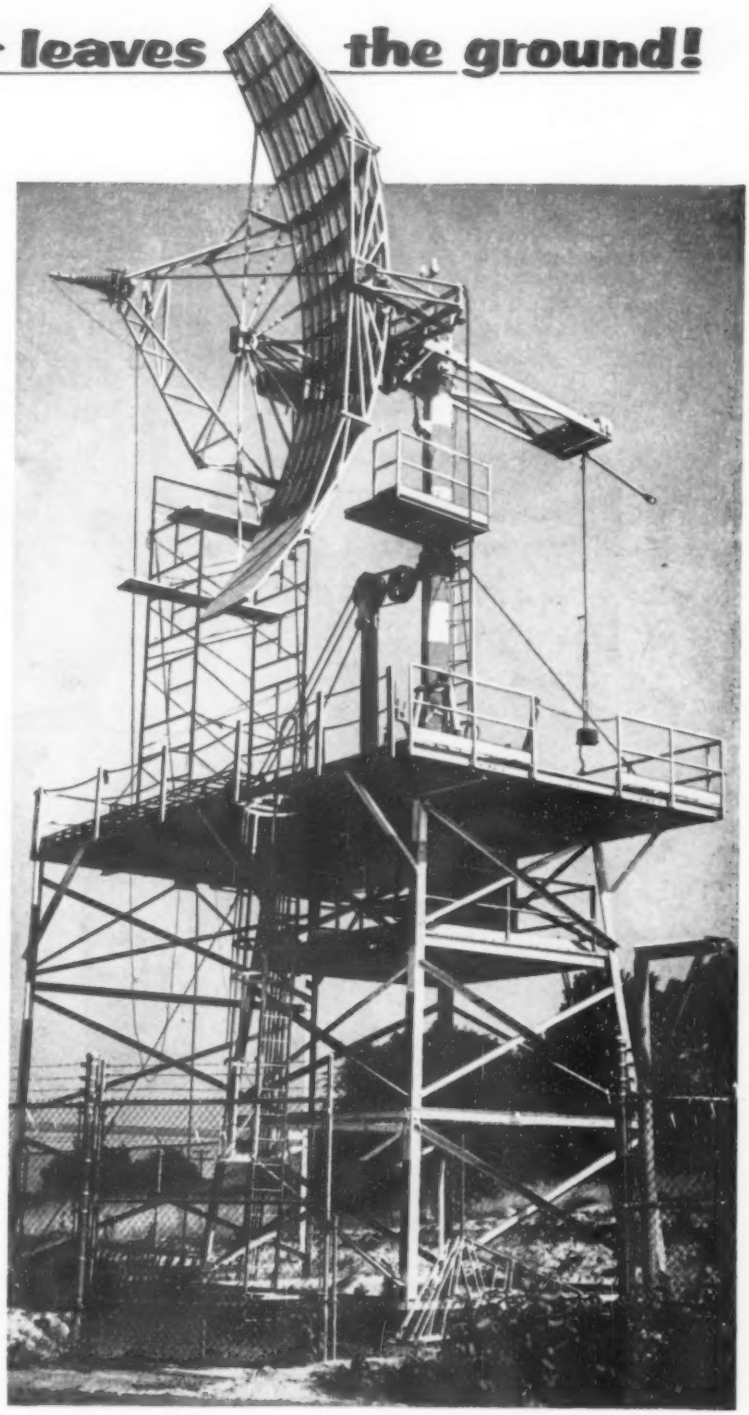
PROCUREMENT REVISIONS

There is one more important advantage in the new program which I would like to talk about before I leave the subject. The rate of build-up projected in the 137-wing program has permitted an extensive revision of the aircraft procurement program. It has permitted the Air Force to give attention to manufacturers' capabilities to produce new jet aircraft and to the very difficult problem of sustaining a vigorous aircraft manufacturing industry.

(*Continued on p. 28*)

"ALTIMETER"

—that never leaves the ground!



LATEST addition to our Continental Defense System—this powerful new General Electric long-range height finder is, in effect, a land-bound "altimeter."

Utilizing its massive reflector "dish"—a 30-foot contour of close-tolerance fabrication—to pinpoint its powerful beam on a distant aircraft, it accurately determines the target's altitude.

Certain fundamental reasons motivated General Electric in its selection of Goodyear Aircraft Corporation to build the difficult metal structure.

First, Goodyear Aircraft had special welding techniques and vital experience in fabricating aluminum to structural contours.

Secondly, Goodyear Aircraft had the capacity and ability for designing, building and testing of the equipment before delivery to the Government—a program which necessitated creation of a test structure rising six stories in height.

The cooperative effort paid off, and the GE FPS-6 height finder became another contribution accomplished by industrial teamwork for national defense.

The gratifying results typify the way Goodyear Aircraft contributes its skills and facilities to meet the most exacting requirements—to better serve its customers. Goodyear Aircraft Corporation—plants in Akron, Ohio and Litchfield Park, Arizona.

Metal-Working Skills

GOODYEAR AIRCRAFT

☆ THE TEAM TO TEAM WITH in AERONAUTICS ☆

Had the original 143-wing Air Force program been possible, an early production peak followed by a sudden and drastic reduction in aircraft production, to the point of practically closing down the industry, could not have been avoided. Under the new program, the peak has been leveled out. Both the industry and the Air Force now have programs, projected well into the future, which provide for an orderly transition from build-up rates of production to sustaining rates of production. It will preserve an industrial base capable of meeting the contingencies of the future.

The maintenance of a steady level of aircraft production is important under any conditions, but it is crucial when our military plans are focused on the long pull. In these circumstances, we cannot tolerate sharp expansions and contractions in the aircraft manufacturing industry since we may have to call on it for all-out production at any time during a long period of uneasy peace. I need not stress the fact that by so stabilizing the aircraft manufacturing industry we are laying the foundation for efficient production and decreasing costs to the Government.

To sum up: Our new airpower program calls for building solidly every step of the way; for a progressive increase not only in the number of wings but in the combat effectiveness of the force as well; for quality rather than mere quantity; and for an orderly progression which will facilitate the economical and efficient management of the program. It also provides a much firmer foundation on which to expand or accelerate our airpower programs should this become necessary in the immediate or more distant future.

NAVY AND MARINES

In the case of the Navy, although there has been no increase in the number of carrier air groups and antisubmarine warfare, patrol, and helicopter squadrons during the last two fiscal years, there has been an increase of 25% in the number of planes on hand with these units. Also, in the three Marine Air Wings during the same period, the number of combat planes on hand has increased 40 percent.

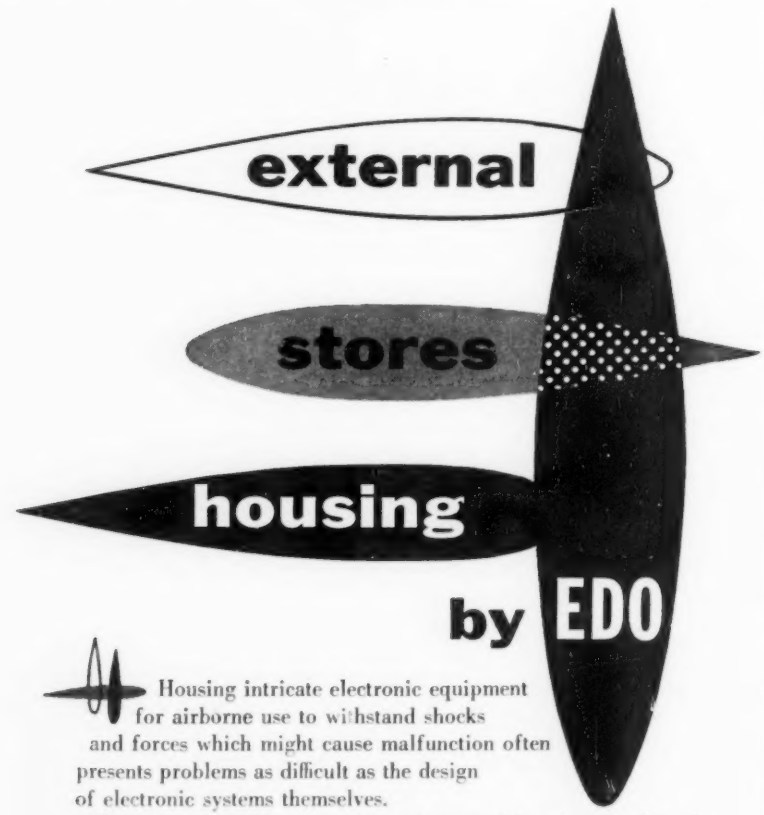
Parallel with the modernization and re-equipping of combat units with higher performance type aircraft, the Navy and the Marine Corps have made great progress in increasing the effectiveness of other units, such as the integration of helicopters into antisubmarine warfare forces, and forces for amphibious assault operating from Navy aircraft carriers.

Several large Navy aircraft carriers have been modernized for more effective antisubmarine warfare, fast convoy escort and close air support tasks. These aircraft carriers provide, by virtue of their speed and size, a more effective antisubmarine weapon than the light-escort class carrier that they replace. Incorporating the angle (canted) deck, improved higher capacity catapulting and stronger plane arresting equipment, they have a capability of operating the newer types of antisubmarine warfare aircraft. More recently, a new carrier conversion program was initiated to incorporate steam catapults and increased elevator capacity.

By using the angle deck for aircraft carriers, the capacity of the ship for handling aircraft on and off the flying deck is approximately doubled. The angle deck development will also make possible savings of 3 million dollars in the construction cost for each new carrier. These improvements are being incorporated in the new Forrestal class carriers now under construction, and are planned for all new carriers to be constructed.

ACCOMPLISHMENTS

I would like to turn now to the accomplishment of our airpower program during the last year. Significant progress has been made in converting our air forces to jet aircraft. Inventories of jet airplanes have been increased about 50%. During the last 18 months,



Housing intricate electronic equipment for airborne use to withstand shocks and forces which might cause malfunction often presents problems as difficult as the design of electronic systems themselves.

Take one example—a pressurized external housing capable of being flown in the trans-sonic speed range and meeting all environmental trials. From wind tunnel tests to complete tooling and manufacture, Edo relieved the electronics manufacturer and aircraft builder of the many problems involved.

If you have an external stores housing problem, no doubt our vast experience in both electronics and aerodynamics can help you.

Edo
Since 1925
CORPORATION
COLLEGE POINT, NEW YORK

XB-62

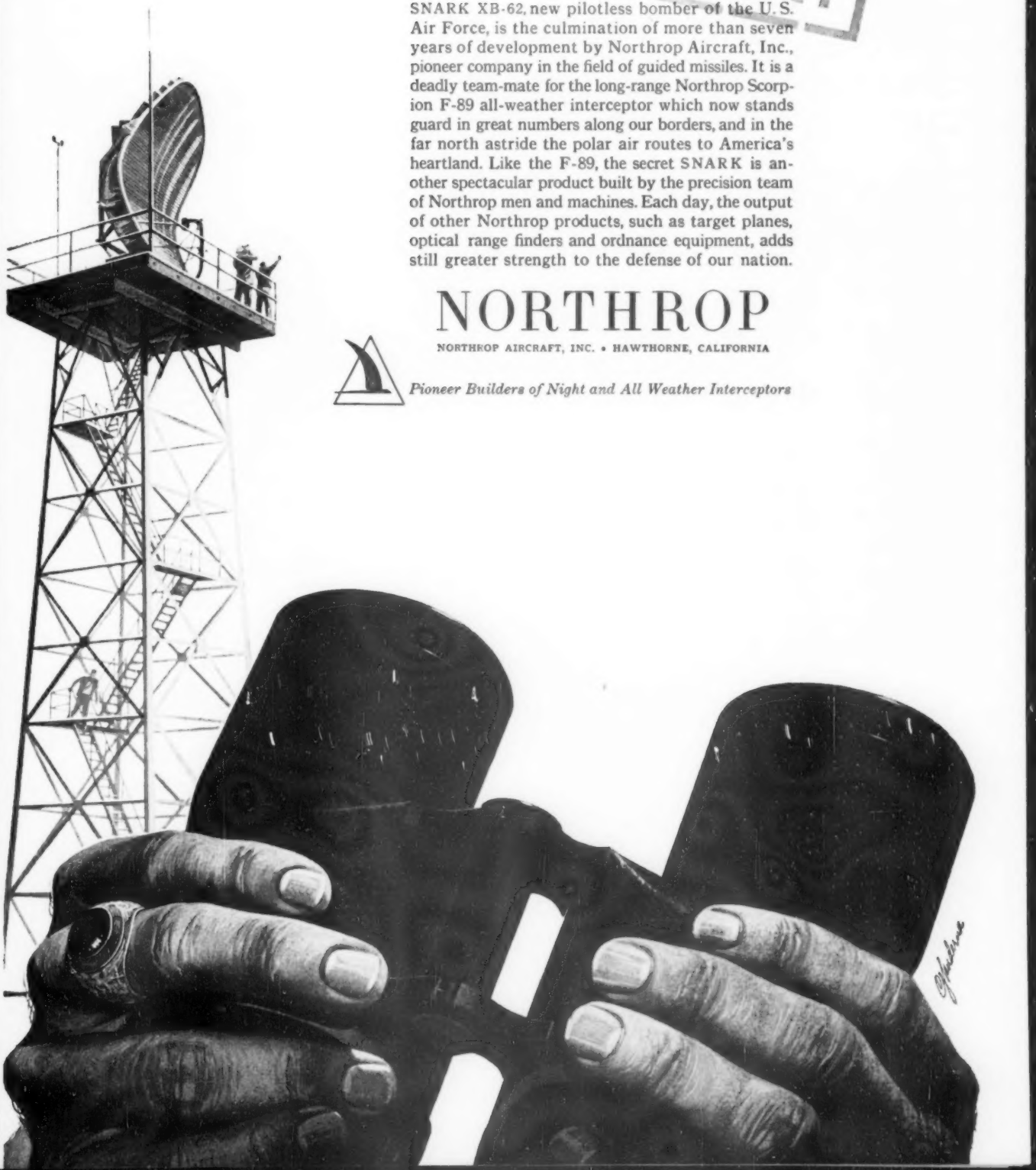
SECRET

SNARK XB-62, new pilotless bomber of the U. S. Air Force, is the culmination of more than seven years of development by Northrop Aircraft, Inc., pioneer company in the field of guided missiles. It is a deadly team-mate for the long-range Northrop Scorpion F-89 all-weather interceptor which now stands guard in great numbers along our borders, and in the far north astride the polar air routes to America's heartland. Like the F-89, the secret SNARK is another spectacular product built by the precision team of Northrop men and machines. Each day, the output of other Northrop products, such as target planes, optical range finders and ordnance equipment, adds still greater strength to the defense of our nation.

NORTHROP

NORTHROP AIRCRAFT, INC. • HAWTHORNE, CALIFORNIA

Pioneer Builders of Night and All Weather Interceptors



the new increase in total Defense Department airplane inventories has been more than double that achieved during the previous two-and-a-half-year period, from the beginning of Korean hostilities to the end of 1952. Modernization of our air forces has proceeded at a rapid pace.

Obsolete World War II types of Navy and Marine aircraft have been replaced by the newest type patrol, attack, search and jet fighter aircraft. Most of the World War II Air Force airplanes, except for a few wings of B-29s, have been eliminated from the front-line combat inventory of the regular Air Force. In fact, the first operational jet fighter, the F-80, has already been eliminated from our front-line combat inventory. The Air Defense Command's present fighter-interceptor force has been substantially modernized.

Last year I said, "By June 1954, the new budget will produce 114 Air Force wings." Actually, the Air Force had 115 wings activated by June 30, 1954. This is an increase of 12 wings over the 103 on hand in March 1953. All 12 of these are combat wings—bombers, fighters and reconnaissance. By the end of fiscal year 1954, the Air Force had 70% more wings in the highest category of readiness than it had in March 1953.

The number of wings in the lowest category of readiness was reduced during the same period to one-third the number in that category in March 1953. Security considerations preclude a more specific statement as to our present level of readiness, but I believe the figures I have cited convey the fact that significant progress has been made in increasing the combat effectiveness of the Air Force as well as the number of wings.

ANG, RESERVES

This improvement in the strength of our regular Air Force has been paralleled by a notable improvement in the strength of the Air National Guard and Air Force Reserve. The number of planes in the hands of the civilian components of the Air Force has more than doubled since March 1953; and 44 fighter, light bomber, reconnaissance and troop carrier wings have been organized. Of the Air National Guard's 87 tactical squadrons, 62 were partially jet equipped on May 1, 1954.

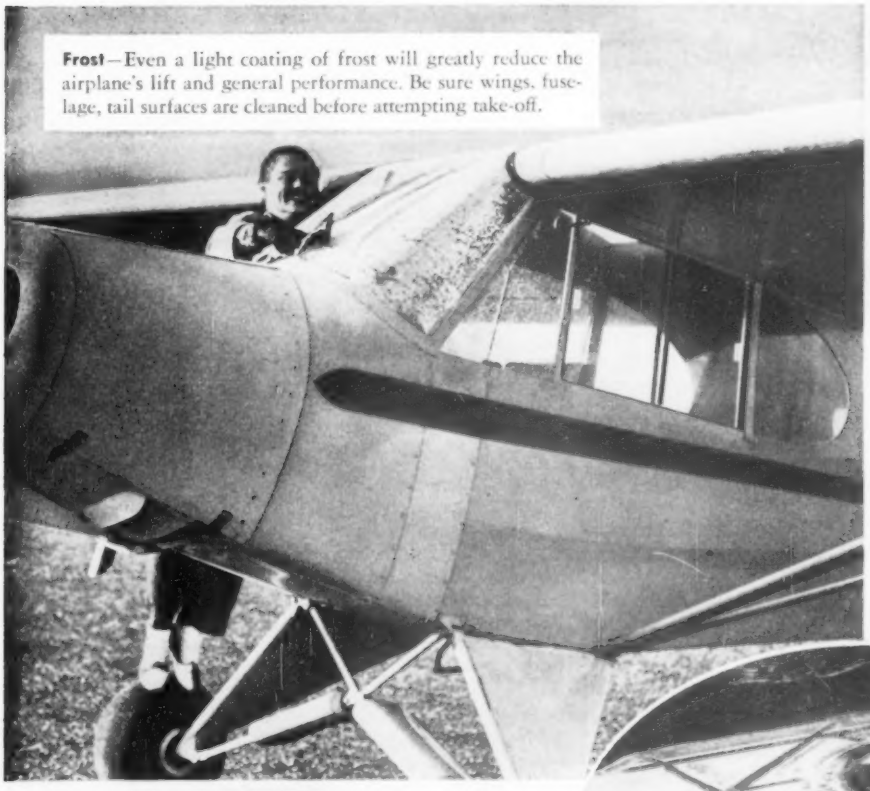
The quality of the planes and equipment being made available to the reserve forces, Air Force, Navy and Marines, is improving in consonance with the increasing availability of modern equipment in the regular forces. The reserve programs of the several military departments, which will be financed by the funds we have recently appropriated for fiscal year 1955, call for improved training of reserve forces and for their closer integration into the overall military plan. The Department of Defense is giving substantially increased attention to these programs in fiscal year 1955 and will continue to do so, with the aim of assuring that this most necessary element of our mobilization base is properly organized, adequately trained, and efficiently utilized.

The Armed Services Committee last year conducted an on-the-spot survey of the training activities being carried out under the reserve program and on Jan. 29, 1954, published a report on it. Just as soon as the Department of Defense has completed its recommendations for this program, our Committee will conduct hearings to determine what legislation is necessary or desirable.

In the meantime, intensive work is being done to hasten the development of pilotless missiles and other weapons of the future. The facts presented to the Senate by the junior Senator from Missouri the other day underline the urgency of this program. They do not demonstrate that less is being done than can practicably be accomplished or realistically aimed at. I cannot, of course, make public the amounts that have been obligated or programmed for research and development in this field. But I can and do emphatically assert

FLY WEATHER-WISE

[These weather items prepared in consultation with the United States Weather Bureau]



Frost—Even a light coating of frost will greatly reduce the airplane's lift and general performance. Be sure wings, fuselage, tail surfaces are cleaned before attempting take-off.

Icing—Be careful of sudden, clear icing glaze in the tops of a cumulus cloud like this when temperatures are below 32°F., especially to leeward of large lakes.

Winter Landings—Be prepared for sudden fogging of windshield when letting down through cloud or even in clear air when moisture content is high. Use more runway, less braking on icy snow.

Freezing Precipitation—Lower deck of stratified clouds may bring freezing drizzle. This usually can be topped at 2500 feet, perhaps with clear skies above. Freezing rain, however, indicates warmer air and cloud layers aloft.

Best Pair to Get You There

Mobiloil AERO

Mobilgas AIRCRAFT

WINTER FLIGHTS call for extra caution on slippery runways ... vigilance against ice, snow and sleet conditions. And that's when, more than ever, it pays to rely on famous Flying Red Horse products—Mobilgas Aircraft and Mobiloil Aero. This top-quality pair meets aviation's toughest tests ... exceeds rigid Army and Navy specifications ... has the approval of every major aircraft builder. Why accept less for your plane? Fly with the Flying Red Horse.

SOCONY-VACUUM OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

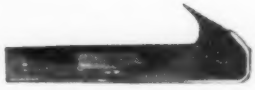
THESE COMPARISONS PROVE

the superiority of VERSON-WHEELON rubber pad forming...

Formed in a Verson-Wheelon Press

Formed in a conventional rubber pad press

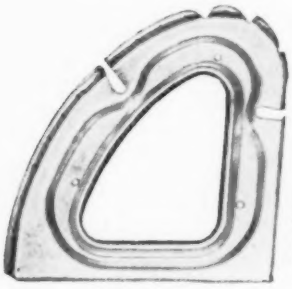
Formed in a Verson-Wheelon Press



Formed in a conventional rubber pad press

Formed in a Verson-Wheelon Press

Formed in a conventional rubber pad press



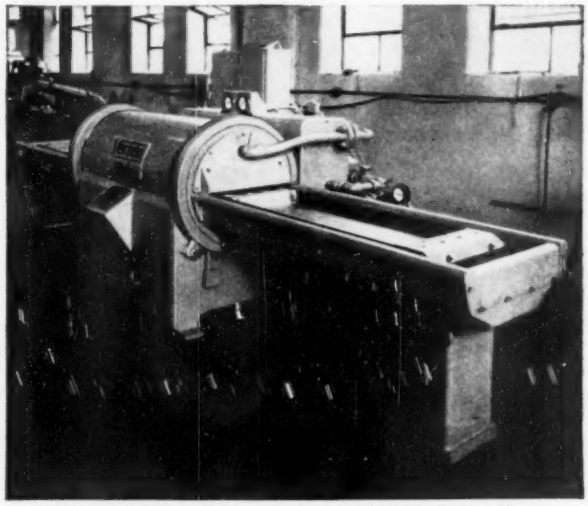
Formed in a Verson-Wheelon Press

Formed in a conventional rubber pad press

The best way to judge the new Verson-Wheelon Direct Acting Hydraulic Press is to compare its work with that of a conventional rubber pad press. The typical examples illustrated above show the difference. Flanges of Verson-Wheelon formed parts are completely formed. Flanges formed in a conventional rubber pad press are often wrinkled and incomplete and require considerable hand finishing.

Add to this the substantially lower price of the Verson-Wheelon unit, its compactness and its elimination of the need for an expensive foundation and you'll see how economy has been combined with superior performance.

Bulletin VW-52 gives design and operating data. Write for a copy.



Verson-Wheelon Press rated at 2500 tons. Operating pressure is 5000 psi. Tray size is 20" x 50". Larger tray sizes and higher pressures are also available.

A Verson Press for every job from 60 tons up.

TRADE Verson MARK

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9311 S. KENWOOD AVENUE, CHICAGO 19, ILLINOIS • SO. LAMAR AT LEDBETTER DRIVE, DALLAS, TEXAS

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

that what is being done and what is being aimed at do not in the slightest fall short of the attainable because of any failure to provide the necessary funds.

PRODUCTION

I would like to speak now of certain problems that have been encountered in aircraft production and to report that production difficulties during the past year have been narrowed to three or four important types of aircraft. Almost all production schedules for heavy bombers, medium bombers, attack planes, transports, trainers, liaison and helicopters are being met 100%.

The strike at North American has temporarily delayed the F-86. Difficulties with the B-57 and F-84F, problems of long standing, are now being overcome. The difficulties which gave rise to the long delays in the deliveries of these two aircraft are precisely what we hope the new program will avoid in the future. The only other problem combat airplane is an anti-submarine warfare plane. Helicopter production problems involve only one major model.

Production of new models of aircraft, such as the F-100, F3H, B-66 and B-52, is proceeding satisfactorily. It is hoped the new policy of holding production of new aircraft to low initial rates until

75%

of all the helicopters flying today have

Franklin POWER

Franklin engines are used exclusively in 4 out of the 5 CAA-certificated helicopters under 400 h.p. – Bell, Hiller, Sikorsky and McCulloch. The production of these four manufacturers in the under-400 h.p. category has accounted for 75% or more of all the helicopters built so far.

Franklin's unmatched experience in helicopter power is at your disposal – as are our excellent facilities for subcontracting precision machining and sub-assemblies of highest quality.

AIRCOOLED MOTORS, INC. SYRACUSE, N. Y.

HARDMAN Proudly WE FLY WITH...

DOUGLAS

Flying With Douglas On:

★ Air Algeria	★ LAI
★ Aigle Azur	★ LAN
★ Alitalia	★ Pan American
★ ANA	★ Philippine Air Lines
★ Braniff	★ Sabena
★ CMA	★ SAS
★ Canadian Pacific	★ Swissair
★ Delta—C & S	★ TAI
★ Eastern	★ UAT
★ Japan Air Lines	★ United
★ KLM	★ Western

HARDMAN SIESTA Seats

HARDMAN TOOL & ENGINEERING CO.
1845 S. Bundy Drive • Los Angeles 25, Calif.

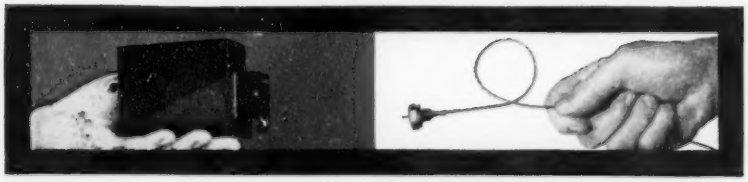
Selected for use in our most modern fighter, the F-102—
Edison's *new* fire detection system proves outstanding under the most rigorous performance conditions. For the research facilities of the world-famous Edison Laboratory—and unequalled experience now provide an aircraft fire detection system that meets *all* of the requirements for today's flying.

- **Simple, fool-proof operation** — a single wire centered in thermistor material with a grounded outer sheath — temperature sensitive at all points.
- **Exclusive power principle** — operates from primary battery supply — eliminates electronic tubes.
- **Adds almost negligible weight** — the control assembly tips the scale at only .8 pound—100 feet of sensing cable, at 1 pound.
- **Low impedance design** — to eliminate completely false alarms due to moisture or capacitive effects.
- **Responds within seconds** — signals "Fire Out" automatically — and responds repeatedly to fire exposure.
- **Exclusive snap clamps** — to allow simple installation — speed maintenance.
- **Varying temperature alarm points** — from the same detector circuit within a single cable loop — guarantees maximum sensitivity for each area guarded.
- **Vibration and shock resistant** — because there are no moving parts — no ceramic to crack in the easily flexed cable.

Won't you write us for complete data on this revolutionary development?

Thomas A Edison

A GREAT NAME CONTINUES GREAT NEW ACHIEVEMENTS



Thomas A. Edison, Inc.

INSTRUMENT DIVISION • 49 LAKESIDE AVENUE • WEST ORANGE, NEW JERSEY

the aircraft has been thoroughly tested and has fully demonstrated its ability to meet service requirements, will preclude a repetition of the F-84F type of experience after full production is started.

Another major accomplishment in developing our national airpower during the last year has been the complete reprogramming of the Air Force build-up. Secretary of Defense Wilson, in his statement before the Senate Appropriations Committee on the fiscal year 1955 budget, reminded us that there are three distinct methods of achieving economy in military affairs:

First, economy in planning, or, as some call it, economy in forces.

Second, economy in programming, and,

Third, economy in operation.

Programming is the area in which forces, weapon systems and strategy are translated into requirements for manpower, combat materiel, construction resources, etc.; which, in turn, determine the amount of money to be spent. Economy in programming is achieved first by providing only for essential activities and programs and by eliminating the marginal and merely desirable; and second, by maintaining flexibility and balance among all activities and programs—men, materiel, bases, activations and conversions of units, training rates, operating rates, deployment, etc.

OUT OF BALANCE

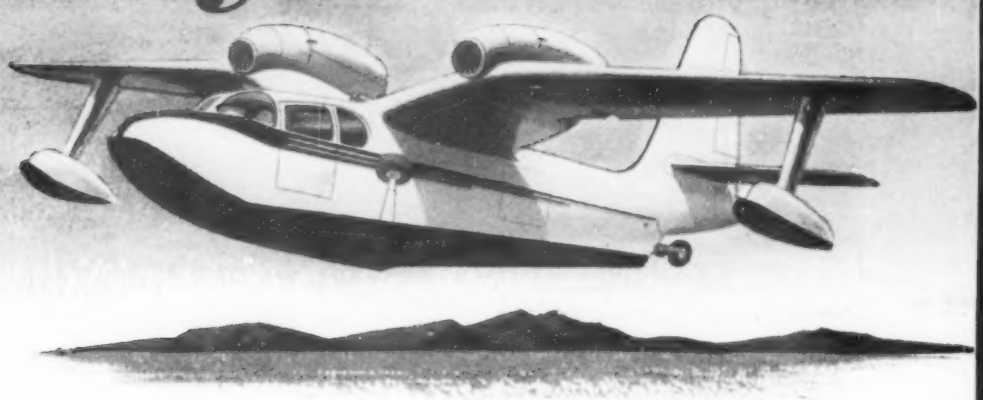
The Air Force program, by the end of 1952, was sadly out of balance. The details of this imbalance have already been recounted numerous times, and I shall not dwell on them now. What I wish to report is that major strides have been made within the last year to bring the Air Force program back into balance.

The more realistic rate of buildup provided in the new 17-wing force goal has greatly facilitated this rebalancing of program elements and has greatly enhanced the possibility of keeping the program in balance in the future.

The Air Force personnel, materiel, and base construction programs have been rephased, first to bring them into alignment with the 137-wing build-up schedule, and second to bring them into balance with one another. The results of this major program adjustment have apparently created a misleading impression in some quarters. It is obvious that when a program is already seriously out of balance, the only way to rebalance it is to adjust those elements which are out ahead and speed up those which are lagging. This is exactly what the Air Force has been doing during the last year.

The program element which has lagged the most has been base construc-

Announcing- the Royal Gull



an all-new, twin-engine gull-wing amphibian

Eleven Royal Gulls destined for military use with the Italian Air Force. These planes have been in rugged military service with the I.A.F. for more than three years without interruption in operations from any cause. They were built by the world famous Piaggio & C. plant at Genoa, Italy.

PERFORMANCE DATA AND SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Overall length	35'6"
Wingspan	44'5"
Height	11'6"
Wing area	268 sq. ft.
Empty weight	3900 lbs.
Max. useful load	1940 lbs.
Gross Weight	5840 lbs.

POWER PLANT

Two Lycoming GO-435-C2B ..... 260 hp ea.*

Propellers: Hartzell, three blade, variable pitch, constant speed, full feathering

Fuel capacity ..... 190 gal.

All-metal, monocoque construction.

*Optional—Two Lycoming GO-480 (270 hp) engines. Performance ratings increase proportionately.

PERFORMANCE

Maximum speed (at sea level)	approx. 180 mph
Cruising range	over seven (7) hrs. with reserve
Cruising speed (at 7000 ft. and 72% power)	approx. 160 mph
Climb to 3000 ft.	3 min., 2 sec.
Service Ceiling (both engines)	18,000 ft.
Service ceiling (one engine)	over 5,000 ft.
Take-off run, land	787 ft.
Landing run, land	722 ft.
Time for take-off from water (no wind)	18 sec.

HERE'S a working ship that's specially designed for the man who's going places. Be he air-minded executive, aerial surveyor or company pilot, he'll go "sky-wide and handsome" in the exciting new Royal Gull.

If you're that man, this amphibian puts new, more useful wings at your command . . . provides convenience unobtainable in any other type of aircraft. Go when you want . . . at speeds approaching three miles per minute. Fly where you will . . . in 5-place executive comfort up to a thousand miles or more. And land where you please . . . any airport, lake or river can be your landing field.

Learn more about this new concept in utility and convenience. Write on company letterhead for your copy of the 8-page brochure on the Royal Gull.

A real record breaker . . . the Royal Gull, piloted by a woman, recently set a world's distance record for amphibians in its class . . . 1865 miles non-stop.

Royal

AIRCRAFT CORPORATION

Subsidiary of Kearney & Trecker Corp.

6784 W. National Ave. • Milwaukee 14, Wis.

America's first jet transport is in the air

This is America's first jet transport, pictured on the historic occasion of its first flight. When it lifted off the runway at Boeing's Renton, Washington, plant, it marked a milestone in the field of aerial transportation in this country.

The airplane you see is a prototype model, built to carry forward flight test work and to demonstrate the advantages of its advanced design. Faster than any previous transport by more than 100 m.p.h., it can span the continent in five hours, the Atlantic in seven.

In a tanker version, the new Boeing will be able to accompany jet bombers and fighters on their missions and refuel them in flight at their most efficient speeds and altitudes. And as a military transport, it will provide a vital personnel and cargo supply line geared to the speed requirements of all-jet military operations.

The new jet—to be known as the Stratotanker in its military configuration, and as the Stratoliner in its commercial version—is now undergoing intensive flight tests at Seattle. These tests will enable Boeing to prove out all details of the design, systems and installations. The experience gained in building and test-flying the prototype has an additional advantage. It makes possible delivery of a better production model, at a much earlier date than would be possible without such specific prototype experience.

America's first jet transport is backed by Boeing's unequalled experience in the field of large, multi-jet aircraft. It is backed, too, by Boeing's 38-year history of designing and building advanced aircraft of remarkable performance and dependability.

BOEING

tion. A major effort has been made and is continuing to bring this program abreast of the new 137-wing build-up schedule. There is every indication that this can be substantially accomplished. The adjustment in the force build-up will greatly facilitate the proper basing of units as they are manned and made ready to function.

RESHUFFLE

A very extensive rescheduling of procurement has been required to bring the materiel program into balance with the other major program elements and the new 137-wing build-up. This has involved the modification or cancellation of some aircraft contracts and the cancellation or adjustment of numerous contracts for aircraft components and other major procurements.

During the first 11 months of fiscal year 1954 the Air Force "de-obligated" $1,800 million in the Aircraft and Related Procurement Appropriation alone, and for the year as a whole de-obligations may total $2 billion. These de-obligations, in general, reflect a reassessment of requirements in the light of more stringent standards of need or more recent operating experience. For example, increased engine life expectancy and the cessation of combat operations in Korea enabled the Air Force to cancel about $500 million worth of engines and engine parts.

The cancellation of the T-36 trainer contract produced a de-obligation of about $120 million. The reduction in the heavy press program resulted in the de-obligation of about $52 million, and so forth.

This rescheduling of procurement was also required by the inauguration of the new Air Force Forward Purchasing Policy which is designed to time the placing of follow-on contracts so as to maintain uninterrupted production while at the same time holding down the further accumulation of unfilled orders in the hands of manufacturers.

FLEXIBILITY

This is one of several actions taken by the Air Force to place its buying operations on a more businesslike basis. By letting new contracts at the latest time possible, without creating gaps in the production lines, the Air Force retains maximum flexibility in its procurement program. More time is available to make changes in the program or in the aircraft to be procured. Furthermore, this policy provides a much needed incentive for the contractors to meet their production schedules. No new contracts will be placed with a manufacturer until he has satisfactorily performed on the contracts he already has.

This appears to me to be a very sound business practice. The inauguration of this new policy tended, tempo-

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

How about the engineers?

Not the department chiefs, but all the slide rule experts who—in anonymity—help create new aircraft, then take a quiet back seat to the planes, the boss and the test pilots.

Invariably the chief engineer is credited with a new design, not because he pushes himself into the publicity spotlight, but because it would be impossible for a newspaper or even a magazine to give credit to everyone who has a share in a development. So the top man is automatically chosen to represent engineering.

Yet behind him are hundreds of men who do the monotonous board work and fight out the myriad individual problems to solutions that result finally in the completed airplane.

What kind of men are they?

In the first place they're dedicated to their work, motivated by intense interest, years of formal training and acceptance of challenge.

By and large, they're creative, independent thinkers and their ideas provide a constant stream of advances for the industry, some large, some small, but all vital to continuing development.

Socially they are said to be quite clannish, preferring the company and understanding of other engineers. In fact, it has been reported they play bridge with slide rules! There's no doubt they're conservative as a class and apply the same analytical thinking to political and economic questions that they devote to engineering problems.

In the industry's postwar slump, aircraft engineers found the going rugged. There was little development work going on and hence no need for the new ideas of men who could transfer them to a blueprint.

But with the resurgence of air power and rising demands for special skills and ingenuity—particularly in the missile field—the engineers found themselves once more in demand.

So involved is their work today, for instance, that the intricacies of a single rocket launcher on a jet fighter can require nearly as many engineering man-hours as the design of a World War II combat plane.

The average engineer has four years of college training and follows through with night school and extension courses to keep his abilities abreast of the problems that confront him. Ordinarily he starts in layout work, progresses to checking and engineer classifications and from there to lead man, group engineer, design specialist, staff engineer, assistant project engineer and project engineer—a long haul of at least 15 years.

And he might work in any one of several divisions from aerodynamics to hydraulics, from power plants to electronics, structures, test, etc.

Unfortunately the measure of his success is not always predicated on his abilities with new ideas, new materials and new criteria. As in many another field, ambition and personal drive count heavily, along with personality.

Individually most engineers are not too concerned with public credit. They distrust the layman as far as technical understanding and appreciation are concerned. They'd far rather win the praise of their superiors and the plaudits of their co-workers than hit the public prints. And the final accolade, of course, is to see their projects achieve success.

But ahead—always—are more projects, more critical requirements, more involved problems.

And because the aircraft engineer is finally winning the recognition he deserves, he will achieve the status that goes with it, both in better salary and better working conditions, even to specially designed buildings for his comfort and efficiency. He's solidly established and there should be no further worries about diminishing demand for his skills.

Whittaker takes its hat off to these men who are the guts of famous company names and smaller manufacturing concerns, too. Without them there would be no aircraft industry.

ADEL

TEM

EQUIPMENT

Precision-Built . . . for Precision Performance!

Insure the reliability of your aircraft with Adel-Designed Fuel System Equipment for every Military and Civilian Application. A wide range of these consistently dependable units are available for small and large airplanes and helicopters.

SERIES 27400

Engine-Driven After Burner Fuel Pump with Solenoid Operated Clutch

Solenoid data: 16-30 V.D.C. continuous duty
Pump data: 50 G.P.M. at 300 P.S.I. at 3420 R.P.M.

SERIES 27275

Emergency Fuel Pump with By-Pass and Relief

Duty: 27.5 V.D.C. continuous
Output: 70 G.P.H. min.
Discharge Pressure: 10 P.S.I.G.
Radio noise filter.

SERIES 22979

Turbine Fuel Pump —Electric Motor Driven

Output: 117, 90 and 90 G.P.H. at 6, 19 and 15 P.S.I.
Duty: 27.5 V.D.C. continuous
Radio noise filter.

SERIES 26900

Submerged Fuel Boost Pump with By-Pass and Relief

Duty: 12 and 24 V.D.C. continuous
Output: 40 G.P.H. min.
Discharge Pressure: 11 P.S.I.G.

SERIES 23900

Engine-Driven Fuel Boost Pump —Impeller Type with Integral, Adjustable By-Pass Valve

Shaft Speed: 3420 R.P.M.
Flow: 14120 LB./HR. min. at 85°F. fuel temp.

For complete engineering specifications and counsel, write

Adel Division, General Metals Corporation, 10777 Van Owen Street, Burbank, Calif.

ADEL — LEADER IN AIRCRAFT EQUIPMENT

DIVISION OF GENERAL METALS CORPORATION • BURBANK, CALIF. • HUNTINGTON, W. VA.

CANADIAN REPRESENTATIVE: RAILWAY & POWER ENGINEERING CORPORATION, LIMITED.

rarily, to reduce the rate of new obligations, but it has not reduced the rate of production. The placing of follow-on contracts earlier than required to maintain uninterrupted production merely increases the industry's backlog of unfilled orders and not the number of aircraft and other materiel delivered to the Air Force.

The small amount of Air Force obligations for aircraft and related procurement during the first ten months of fiscal year 1954 has given rise to considerable conjecture and comment. Let me state, without reservations, that this lag in obligations does not imply a delay in currently programmed aircraft deliveries. Neither does it imply a sudden drop in future aircraft deliveries.

OBLIGATIONS

There are a number of very cogent reasons why Air Force obligations for aircraft and related procurement were so small during the first 10 months of the last fiscal year.

First of all, the only obligation figures regularly reported by the Services are **net** obligations, that is total new obligations less de-obligations. In fiscal year 1954, the Air Force estimates that approximately $3.7 billion of aircraft funds were obligated. Since de-obligations in that year were about $2 billion, **net** obligations amounted to only $1.7 billion.

Second, the Air Force has been making an intensive effort to get its procurement program on a sound controlled basis, to eliminate practices which have been criticized by the Congress and the General Accounting Office and, in general, to introduce more businesslike buying procedures. Many of the actions taken in this effort, such as the forward purchasing policy which I have already discussed, have had the effect of temporarily postponing the placing of new contracts and in some cases causing the de-obligations of funds.

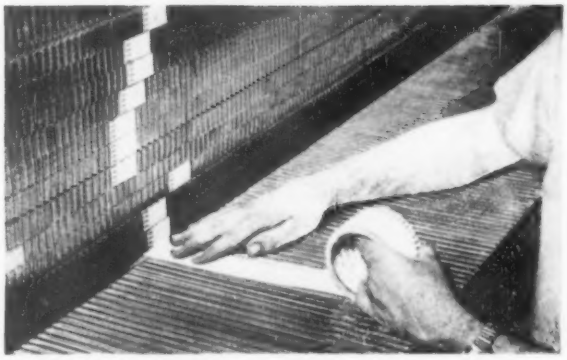
The Air Force has just completed a rather detailed study of the factors contributing to the delay in new obligations during fiscal year 1954. The unobligated balance in the Aircraft and Related Procurement appropriation at the end of that fiscal year is now estimated to be $4,490 million. Of this, $1,645 million is reserved for application against the fiscal year 1955 program. The balance, $2,845 million, represents funds which were originally planned for obligation in fiscal year 1954, and which are still required for fiscal year 1954 and prior year programs.

The study indicates that almost two-thirds of this "unplanned" unobligated balance of $2,845 million on June 30, 1954, was ascribable to two factors, the forward purchasing policy, to which I have just adverted, and the new spares procurement policy which I shall discuss in a moment. The fact that these

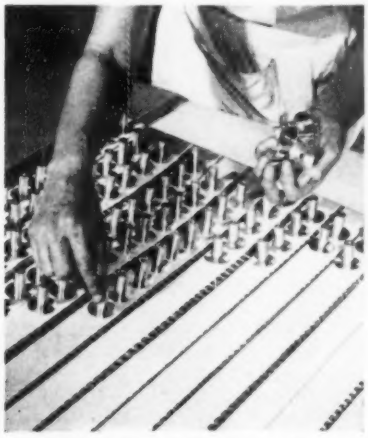
Whatever the job . . .

PERMACEL TAPE

ECONOMY IN PRODUCTION of the Martin Matador, new pilotless bomber, is the result of new techniques in which Permacel Tapes are used for a wide variety of cost and time saving applications.



HONEYCOMB "LUMBER" of aluminum, used in new adhesive bonding technique, is marked by Permacel 725 Printed Tape with part No. identification prior to being sawed into various-size panels.



PERMACEL 77 Crepe Paper Masking Tape, adhesive side up, holds light-weight aluminum thimbles for adhesive spraying.

ELECTRICAL TERMINALS insulated with Permacel 30 Heavy Duty Plastic Tape for exceptionally high dielectric strength.

"FLYING COLORS" for all aircraft quickly, easily—by masking paint jobs with Permacel 71 Stain-Resistant Masking Tape.

SELF-STICKING

PERMACEL® TAPES

Many jobs can be done faster, better, easier, with self sticking tape . . . write Permacel Tape Corporation, New Brunswick, N. J.

Quality, Economy, Delivery

from **Jennies** to **Jets**

Demonstrated and proved ability to produce quality products . . . at economical costs . . . and delivery where and when you want them has been a big factor in Kawneer's success in the aircraft industry.

From World War I when we first developed streamlined steel tubing for struts and empennage frames, we've never stopped gaining good solid experience . . . experience that now enables us to efficiently produce complete cockpit enclosures, and other assemblies for jet aircraft.

Kawneer's recently built 110,000-square-foot plant, manned by a well qualified management team and abundant skilled manpower, is 100 percent privately financed, proof that we are in the aircraft business to stay. All our new machines and equipment were planned and purchased to give Aircraft Producers and U. S. Government Procurement Agencies a dependable money-saving source.

We invite your inspection at any time. But if you cannot visit us, we'll be glad to send our illustrated brochure or have one of our qualified representatives call on you.

SINCE 1907, FABRICATORS OF METAL AIRCRAFT ASSEMBLIES AND ARCHITECTURAL PRODUCTS

funds remained unobligated at the end of the fiscal year should offer no cause for alarm since their obligation in fiscal year 1954 was not required under the new procurement policies.

SPARES POLICY

With respect to the spares policy, it had been the practice of the Air Force in the past to include in aircraft contracts a lump sum amount to cover the total estimated cost of future engineering changes, spare parts, training equipment, special tools, etc.

The General Accounting Office pointed out that the contractual provisions setting up these lump sum amounts did not authorize performance by the contractor but required subsequent action by the Government contracting officer, when the requirements for engineering changes, spares, etc., were finally determined.

In effect, these lump sum amounts recorded as obligations were not a true liability of the United States Government and, therefore, were not true obligations.

The new policy discontinues this practice. Funds for engineering changes will not be obligated until the changes have been determined and directed by the Air Force. Spare parts monies will not be obligated until the spare parts requirements have been determined both as to items and quantities and placed on order.

The net effect of this action was to reduce the amount of new obligations in fiscal year 1954 below the original estimate which included this type of pseudo obligation. This same policy resulted in the de-obligation of $350 million (of the $2 billion total) during fiscal year 1954, representing the reduction or cancellation of spares contracts for which definitive lists of items to be procured were not available.

Again I want to point out that this more businesslike practice will not in any way delay the actual production of spare parts or the introduction of necessary engineering changes.

CONTRACTING

Another new policy introduced by the Air Force within the last year precludes, as a general rule, the placing of new contracts with a contractor where contract finalization or price redetermination is past due on existing contracts. This action was taken to provide an incentive to both the Air Force buying personnel and the contractor to bring up to date all contracts on which price redeterminations or contract finalizations were delinquent, another matter criticized by the General Accounting Office.

This action also contributed to the reduction in new obligations during fiscal year 1954, but it was not allowed to delay production. Now that most

Tandem performance with Hi-D HEAT EXCHANGERS *heat exchangers, too!*

Liquid-to-liquid **Hi-D** Heat Exchanger combination. Main Fuel Heat Exchanger U-515150 hooked in tandem with the U-515155 Afterburner Fuel Heat Exchanger functions to cool engine lubricating oil. A UAP valve, mounted on each exchanger, incorporates maximum fuel temperature limiting control and cold start oil surge pressure relief.

These **Hi-D** Heat Exchangers are engine mounted. All-brazed stainless steel construction. Low oil pressure drop. Approximately **300 BTU/min. per lb. of heat exchanger weight.**

UAP
UNITED AIRCRAFT PRODUCTS
a famous family of aircraft essentials

UNITED AIRCRAFT PRODUCTS, INC.
1116 BOLANDER AVE. • DAYTON 1, OHIO

(MODEL DEPICTS TANDEM HOOKUP OF 20 MULE TEAM HAULING BORAX FROM DEATH VALLEY, CALIF.)

delinquencies have been corrected, the placement of new contracts can proceed on schedule.

I was pleased to note in the Air Force study that $90 million of the amount de-obligated in the aircraft appropriation during fiscal year 1954 was the result of such price redeterminations.

LETTER CONTRACTS

The Air Force, in the past year, has greatly reduced the use of letter contracts for the procurement of aircraft and other major items of equipment. Finalized contracts are now the rule and the letter contract is used only in exceptional cases. This is as it should be. The letter contract was never intended in Government procurement as a substitute for a finalized contract. It is to be used only in exceptional cases and in times of emergency. Where used, it is to be replaced at the earliest possible time by a definite contract.

The Air Force action tightening up on the use of letter contracts was long overdue, but it has served to reduce, temporarily, the obligation of aircraft funds. The Air Force buyer must now complete his contract negotiations, including specifications and all other terms of the agreement, before the money is obligated rather than after, as is the case where a letter contract is used.

I feel confident that in the long run this return to sound business practices will speed up the procurement of aircraft and other aviation equipment rather than delay it. Both the Government and the contractor will know better where they stand and the possibilities for misunderstandings and disputes will be reduced.

One final point in this regard. Purchases by one military department through another military department will no longer be reported as obligations until the funds are actually placed on contract and the Government incurs a liability. This change in policy also contributed to the recent reduction in the rate of obligations.

It is estimated in the Air Force study that two-thirds of the "unplanned" unobligated balance of $640 million in the major procurement account on June 30, 1954, represented Air Force purchase requests transmitted to one of the other services but not yet reported back as being placed on contract.

NET OBLIGATIONS

I believe it is quite clear that the relatively low level of Air Force **net** obligations for aircraft and related procurement during the first part of the past fiscal year reflects, essentially, the introduction of more businesslike buying practices in Air Force procurement. Now that the transition to the new procurement ground rules has been substantially completed, the rate of obligations is beginning to rise sharply.

Net obligations of aircraft funds in May, $450 million, were 20 percent higher than the total net obligations in the first 10 months of fiscal year 1954. June figures are not yet available but the Air Force estimates that net obligations of aircraft funds in that month will total $900 million, twice the May figure.

The adjustments in procurement programs and improvements in procurement procedures, which I have described, have not, and will not, delay the 137-wing build-up. Indeed, I am firmly convinced that the action taken in the last year will assure the successful accomplishment of that goal.

PERSONNEL

Great progress has also been made by the Air Force during the last year in realigning its military personnel program. Personnel requirements have been given a very careful scrutiny. The Air Force now feels it can man the new 137-wing program with 975,000 military personnel. Two years ago the Air Force stated to the Congress that it would require 1,210,000 military personnel to man a slightly larger force of 143 wings.

This reduction in military personnel

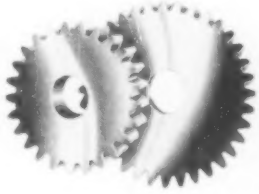
Aircraft hydraulic and mechanical controls by Sargent

Sargent has been building *dependable* hydraulic and mechanical controls since 1920. Today, leading builders of military and commercial aircraft recognize Sargent's *undivided responsibility* in research, engineering and manufacture as the standard of excellence for the production of these components.

The story of Sargent's organization, methods, and manufacturing facilities will show you how Sargent can work for you profitably and efficiently. Why not write today for your copy of the Sargent Aircraft Brochure?

SARGENT BUILDS

Aircraft Power Control Assemblies • A Complete Line of Gears and Gear Assemblies • Actuating Cylinders • Shimmy Dampeners • Servo Valves • Sequence Valves • 3-Way and 4-Way Selector Valves • Directional Valves • Relief Valves • Pressure Regulators Brake Valves • Pressure Reducing Valves



Standard of Excellence **Sargent** *Since 1920*

"Good will" is the disposition of the pleased customer to return to the place where he has been well treated.
— U.S. Supreme Court

ENGINEERING CORPORATION
2533 EAST 56TH STREET
HUNTINGTON PARK, CALIF.

NEW **HIGH** ACCURACY

LOW WEIGHT

SYNCHRO RECEIVERS

Weight of this receiver is less than 2 oz.—torque exceeds 2,300 mg mm/degree—accuracy 30 minutes, total error spread. Used in conjunction with a Clifton transmitter, overall system errors of less than 40 minutes spread—±30 minutes approximately—are to be anticipated.

The same engineering team that developed the original 1.437" diameter high precision synchro has immediately available on a production basis these high torque high accuracy transmitter-indicator combinations at a saving of almost two-thirds the weight.

For full information on these and other units of this complete series of high accuracy Size #10, Size #11 and Size #15 units, write or telephone T.W. Shoop, Sales Manager, MAdison 6-2101. (Suburban Philadelphia)

cppc

CLIFTON PRECISION PRODUCTS COMPANY INC.

CLIFTON HEIGHTS 11 PENNSYLVANIA

requirements has been achieved without detracting from the combat effectiveness of the Air Force. Reductions have been made in many of the areas repeatedly criticized by the Congress—Air Force bands, air police, headquarters personnel, training personnel, military personnel in jobs which can be done by civilians, etc.

With respect to the last item, the Air Force "Native Son Project" alone promises ultimately to reduce military personnel requirements overseas by some 43,000. More than two-thirds of this reduction has already been realized. It is planned also to extend this concept to the Continental United States by substituting civilians for military personnel in areas where such interchange is feasible and economical.

The early release of airmen whose terms of enlistment were close to completion and who had no intention of reenlisting, together with the early release of those airmen of marginal value to the service, has placed the Air Force in a much better position to meet the large-scale turnover anticipated in fiscal year 1955. The Air Force, however, still faces a very difficult recruiting problem.

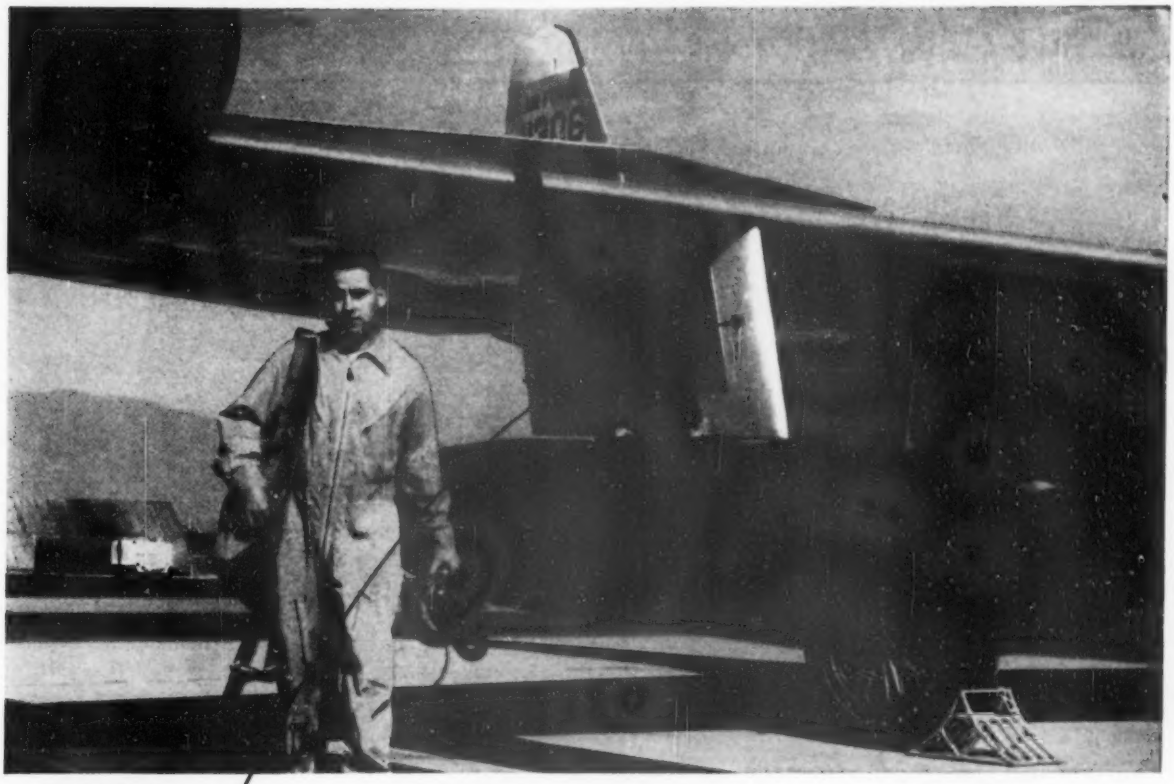
The end fiscal year 1955 goal is 970,000 men, an increase of 20,000. Because of the very high number of separations expected in fiscal year 1955, this net gain of 20,000 cannot be assured without a major recruiting effort. To assist the Air Force in meeting this problem, the Secretary of Defense has recently authorized a separate recruiting service for the Air Force. The Defense Department feels that the greater emphasis being placed on airpower warrants this action.

TRIBUTES

Mr. President, the last year has been a trying period for the military and civilian leaders of our Defense Department. I cannot close my remarks without paying some tribute to the patience, courage and devotion to the national interest demonstrated by these men and their subordinates in the Pentagon and in the field commands.

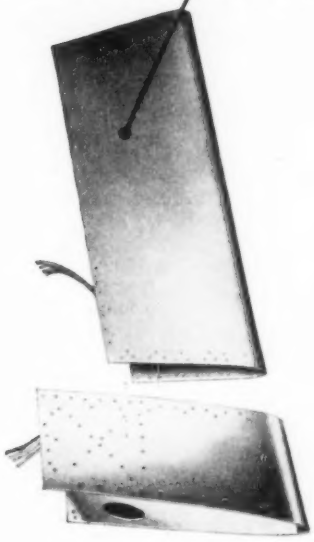
The Air Force has been engaged in a rigorous reexamination of all phases of its program and is making drastic changes in its way of doing business. These changes are now receiving the wholehearted backing of all Air Force personnel. The new program is being pushed with a vigor and determination which is certain to assure its success.

The new manning and procurement policies are being rapidly implemented and loyally supported from top to bottom of the Defense organization. The people of this country have every reason to feel secure in the knowledge that our Nation's defense is in good hands.



COHRLASTIC PYLON HEATERS GUARD AGAINST ICE

. . . provide all-weather protection for the F-89D



Pylon fuel tanks slung on the lower wing surfaces of the U.S. Air Force's *Northrop Scorpion F-89D* increase its range without appreciably affecting speed. In order to prevent or remove ice accumulations on the leading edge of the pylons, *COHRlastic Heaters* possessing multiple wattage densities for variations in heat distribution to required areas were designed, in cooperation with Northrop Aircraft, Inc., engineered and produced as complete assemblies by *The Connecticut Hard Rubber Company.*

Special silicone rubber heating blankets sandwiched between aluminum covers were preformed and molded as complete assemblies. No change in the airfoil shape of the pylons was required because the outer surface of these light-weight, compact and rugged heaters provides the airfoil surface.

All *COHRlastic Heaters* meet MIL and AF specifications. They are easy to install, easy to control, and can be adapted to any size and shape. Exclusive construction features enable these heaters to provide uniform heat distribution for unlimited durations over large or small surfaces. *Cohrlastic Heaters* operate trouble-free in temperatures that range from —100°F to +500°F.

Perhaps *Cohrlastic electro-thermal* methods of protection can be applied with advantage to overcoming your serious *icing* problems in *hard-to-heat* areas. Our field engineers are available for direct contact. *Call or write today.*

Send for Our New 16-Page Illustrated Brochure:
SAFE FLIGHT WITH COHRLASTIC HEATERS

COHRLASTIC

complete aircraft anti-icing and de-icing systems, assemblies, and components . . . designed . . . engineered . . . manufactured

PRODUCT OF THE Connecticut HARD RUBBER COMPANY

407 EAST STREET • NEW HAVEN • CONNECTICUT

Theodor von Karman (left) IAF advisory board chairman, and Guido von Pirquet.

Richard F. Gompertz (left) and Darrell C. Romick, U. S. delegates at IAF congress.

Hermann Oberth (left), pioneer rocket proponent, and IAF president Fred Durant.

Space Flight Needs Only Money, Time

By Frederick C. Durant, III

Innsbruck, Austria—The feasibility of space flight is no longer a topic for academic debate, but a matter of time, money and a program.

In those words are summed the theme of the fifth annual Congress of the International Astronautical Federation, recently concluded here. Delegates from rocket and astronautical societies of 17 countries, representing 7,600 professional-level members, pointed out that the borders of space already are being probed. They said that the first space craft—an unmanned satellite vehicle—would be simply an extrapolation in magnitude of current high-altitude and highspeed rocket-powered flight.

And they stated that postwar research and development on sounding rockets, guided missiles and manned flight in rocket-powered aircraft has benefited astronautics greatly because of the many problems to be solved.

▶ **Who Was There?**—A cross-section of the scientific community attended: astronomers, chemists, flight surgeons, physicists and rocket engineers, specialists in combustion, avionics, materials, aero- and thermodynamics.

This respectability of astronautics at top professional levels has evolved only in the past several years. Not long ago, few scientists or rocket engineers would speak openly on the subject of space flight. If they did, they were apt to get sidelong glances from their colleagues and to hear the derisive label of "Buck Rogers." But realization of the close alliance between the feasibility of astronautics and the rapidly maturing sciences of aeronautics and rocketry has been spreading through military research and development activities.

It is significant that such professionally eminent men as USAF Scientific Advisory Board chairman Prof. Theodor von Karman, and NACA director Dr. Hugh L. Dryden attended the Congress. Both von Karman and Prof. Hans Thirring, Viennese atomic physicist, addressed the session.

Others in attendance were colorful figures from the early history of the new science: Prof. Hermann Oberth, Baron Guido von Pirquet, Dr. Eugen Saenger and Ing. Rolf Engel. Oberth and von Pirquet wrote the detailed classical theory of space flight as far back as 30 years ago, setting out the concepts of step rockets and satellite vehicles and pointing out their importance. Saenger and his mathematician wife, Dr. Irene Bredt, wrote a preliminary design proposal for a long-range rocket bomber before the end of World War II. Engel was one of the first members of the original German rocket society.

Graduates of Peenemuende, wartime German V-2 center were also present, with their former commanding general, Dr. Walter Dornberger, now a consultant to Bell Aircraft Corp.

Frederick C. Durant, III, was re-elected president of the International Astronautical Federation at the fifth annual congress. Now a consulting engineer at Washington, D. C., he was an engineer with Bell Aircraft Corp.'s rocket group (1947-48) and an engineering officer for the U. S. Naval Air Rocket Test Station at Dover, N. J. (1948-51). His earlier experience includes five and a half years in USN aviation research.

▶ **Technical Sessions**—During the technical sessions, 32 papers were presented in English, German and French. The wide range of subjects considered further emphasized the complexity and the high scientific level of astronautics.

Papers were given on problems of space medicine with emphasis on cosmic radiation hazards, high-temperature-resistant materials, theories of combustion, guidance and control, orbital flight systems, artificial satellite design calculations, aerodynamic heating problems, propulsion systems and reviews of astronautical progress.

Some writers considered immediately practical topics, and others considered basic theory or projected their thinking 20 to 50 years or more.

Of special interest to many observers was a film showing of U. S., French and former German developments. The French footage included shots of rocket motor development at Vernon and test firings of the Veronique at Colomb Bechar, French Morocco. Veronique is a sounding rocket similar in design to the Aerobee but with an ingenuous mechanical system for initial stabilization (AVIATION WEEK, Apr. 5, p. 38). According to Prof. E. Vassy of Paris, the Veronique reached an altitude of 84 miles earlier this year.

Summaries

Of the many papers presented, these few have been selected for summarizing as representing a typical cross-section of IAF scientific opinion.

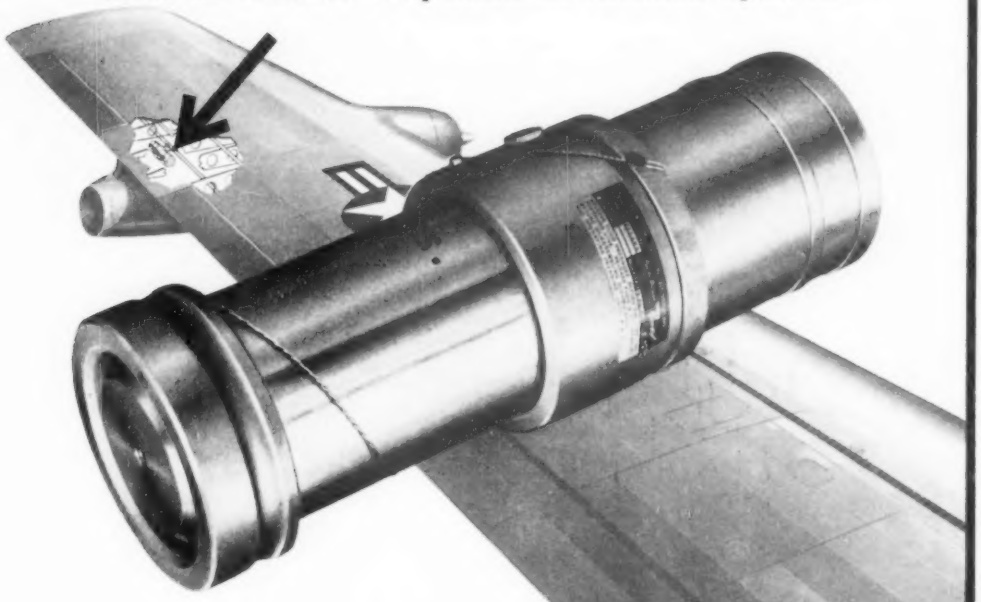
▶ **High-Temperature-Resistant Sintered Materials**—By R. Kieffer and F. Benesovsky, Planseewerke, Reutte.

An examination of current powdered-

BENDIX-PACIFIC

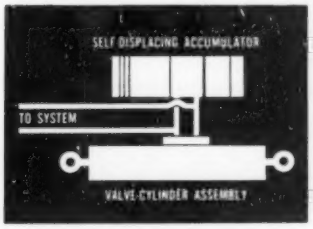
SELF-DISPLACING HYDRAULIC ACCUMULATOR

assures instant response in remote systems

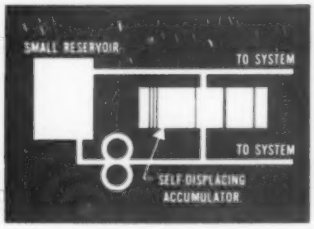


Bendix-Pacific Self-Displacing Accumulators can eliminate serious operational handicaps in remote installations and in closed surface control systems.

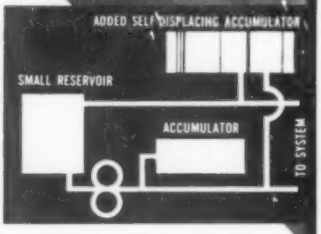
The Accumulators incorporate double chambers and double pistons joined by a piston rod. Half the unit operates as a conventional accumulator while the second half acts as a displacement sump.



For remotely located hydraulic valves which require sudden changes in rates of flow, the problems of large lines, weight, hydraulic hammer and pressure drop are virtually eliminated with the new Accumulator. It is located close to the control valve, resulting in much **faster action** and less pressure surges because the return oil travels a minimum distance.



Use of the Bendix-Pacific Self-Displacing Accumulator in an independent, completely closed hydraulic system simplifies the reservoir problem. Instead of designing a pressurized reservoir capable of accommodating the full displacement of the accumulator, it is merely necessary to provide a reservoir capable of handling expansion of the fluid, plus piston rod displacement, if any.



In systems already designed which require the addition of an accumulator, use of the Bendix-Pacific Self-Displacing Accumulator may eliminate reservoir redesign as the total system volumetric change remains the same.

RADAR

SONAR

HYDRAULICS

TELEMETERING

ELECTRO-MECHANICAL

ULTRASONICS

BENDIX PACIFIC

THEY FLY Bendix AVIATION CORPORATION

PACIFIC DIVISION • Bendix Aviation Corporation

11600 Sherman Way, North Hollywood, California

East Coast Office: 475 5th Ave., N.Y. 17

Export Division: Bendix International 205 E. 42nd St., N.Y. 17

Canadian Distributors: Aviation Electric, Ltd., Montreal 9

metallurgy production techniques and a consideration of some of the potential developments was presented by the authors.

▶**Geodetic Significance of a Minimum Satellite Vehicle**—By I. M. Levitt, director, Fels Planetarium, Philadelphia.

Three possible uses of a 200-mi. altitude, minimum-weight satellite are postulated: international mapping, determination of the earth's equatorial bulge, and determination of the G constant. The satellite would carry no instrumentation, but would be rendered visible by a self-erecting solar reflector.

In mapping, the big difficulty is locating one large earth mass with respect to the other, because of the problem of measuring accurately large distances over water. Thus although the land masses of Europe and the United States are well-mapped, their exact position with respect to each other is not known within several miles.

▶**The Influence of Turbopump Design upon Performance of Large Rockets**—By H. H. Koelle, Stuttgart.

The author examines the advantages and disadvantages of various types of turbopump systems with respect to the performance of rocket vehicles. Turbine design parameters are related to burning times.

NOW COMPLETED
NEW EASTERN AIRCRAFT PRODUCTS PLANT
Located in New Haven (Hamden), Conn., the combination home office and manufacturing plant has modern research and development facilities for aircraft products.
...greater capacity for precision aircraft products
The new Eastern plant was built to meet the rapidly increasing demand for Eastern aircraft products: *airborne cooling units for electronic tubes, pressurization units, and aircraft hydraulic pumps and fluid motors.* The newest facilities are fostering greater research and development studies than ever before, to uphold Eastern's reputation as a pioneer in specialized aviation products designed to meet military specifications.
To discover how Eastern's expanded facilities and research program can help you with your own products write for Eastern Aviation Bulletin 320-M.
Eastern
INDUSTRIES, INC.
100 SKIFF STREET
HAMDEN 14, CONN.
Newton, Mass. plant makes a wide variety of hydraulic and pressurization equipment.
Norwalk, Conn. plant produces electronic tube cooling units and other electronic equipment.

▶**Protection of Humans from Heavy Nuclei of Cosmic Radiation in Regions Outside the Atmosphere**—By H. J. Schaefer, USN School of Aviation Medicine, Pensacola.

The author suggests that a calculated risk of exposure to heavy primaries may be taken, much as in the case of exposure to infrequent large meteorites. Such exposure would not result in immediate incapacitation of the crew because the effects might take weeks or even months to cause observable tissue damage.

Heavy primaries are completely ionized atoms—that is, atoms stripped of orbital electrons, traveling through space at immense velocities. Because of the extremely high energy of these particles, conventional systems of measuring radiological effects are unsatisfactory and an alternate method is considered. "Specific ionization" and "relative biological effectiveness" are defined and the physics of shielding are discussed.

In considering shielding for man in space vehicles, it is pointed out that thin shielding is apt to be worse than none because of a resulting intensification in specific ionization. Curves showing required shielding for complete protection indicate an extreme weight problem.

▶**Space-Equivalent Conditions Within the Earth's Atmosphere—Physiological Aspects**—By H. Strughold, Head, Dept. of Space Medicine, USAF, Randolph AFB, Tex.

The reproduction of static and dynamic conditions of space flight, with respect to the physiological effects, is considered for flight within the earth's atmosphere.

The effects of zero atmospheric pressure and disappearance of oxygen from the air upon man are enumerated. Static space equivalent conditions such as solar and cosmic radiation and meteors are considered with respect to the variations caused by the mass and magnetic field of the earth.

The state of zero gravity as it is encountered in flight is a dynamic space equivalent condition. It cannot yet be determined whether the prolonged effect of weightlessness upon man will become a serious medical problem or merely an interesting physiological condition.

▶**Fundamental Research in Molecular Reactions of Combustion**—By Irene Saenger-Bredt, Paris.

Original equilibrium and mass-action studies do not provide the fundamental understanding of highspeed exothermic reactions; a new experimental method of "crossed molecular beams" is presented.

▶**Research in Nuclear Combustion Problems**—By E. Saenger, Paris.

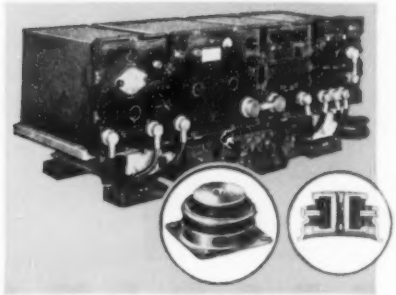
Heat production of ultra-high tem-

JUST A MATTER OF CONTROL

LORD ENGINEERING CONTROLS VIBRATION . . . anywhere!

Your continuing effort to improve your products and reduce their maintenance cost may be entirely A Matter Of Control . . . the control of destructive vibration and shock. To help you to accomplish your objectives, Lord Engineering recommends the correct design, selects the most suitable elastomer and metal, and uses precision manufacturing for all Vibration Control Mountings and Bonded Rubber Parts. Your vibration and shock control problems are our business. We welcome the opportunity of placing our wide experience in many diversified industries at your disposal.

Over 27,000 designs and their variations from which to choose.



The sensitivity of many commercial and military radio transmitters is protected . . . their accuracy is insured against vibration and shock damage by Lord Vibration Control Mountings. Ask for complete details.

LOS ANGELES 28, CALIFORNIA — 7046 Hollywood Blvd.
DALLAS, TEXAS — 313 Fidelity Union Life Building
PHILADELPHIA 7, PENNSYLVANIA — 725 Widener Building
DAYTON 2, OHIO — 410 West First Street
DETROIT 2, MICHIGAN — 311 Curtis Building
NEW YORK 16, NEW YORK — 280 Madison Avenue
CHICAGO 11, ILLINOIS — 520 N. Michigan Ave.
CLEVELAND 15, OHIO — 811 Hanna Building

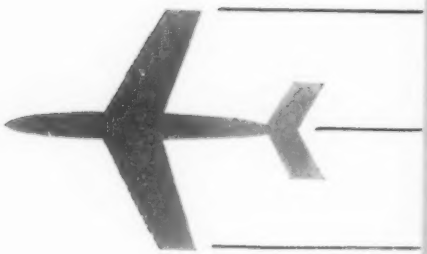
LORD MANUFACTURING COMPANY • ERIE, PA.

LORD BONDED RUBBER

Headquarters for **VIBRATION CONTROL** FOR 30 YEARS

Saginaw offers

and multiple circuits in ball bearing screws offer multiple advantages



- **less weight** In a Saginaw Ball Bearing Screw every ball carries its share of the load. No balls "go along for the ride", simply as spacers. Thus, far fewer balls are required and therefore a substantially shorter, smaller and lighter nut is necessary to contain the balls for a given load.

- **greater capacity** Conversely, a nut of a given length is capable of carrying a substantially greater load than those of other designs. Thus, either way, a Saginaw Screw is advantageous.

- **increased efficiency** Because with multiple circuits, no more than 3½ turns for each circuit are required, the balls operate with greater fluidity — and maximum efficiency.

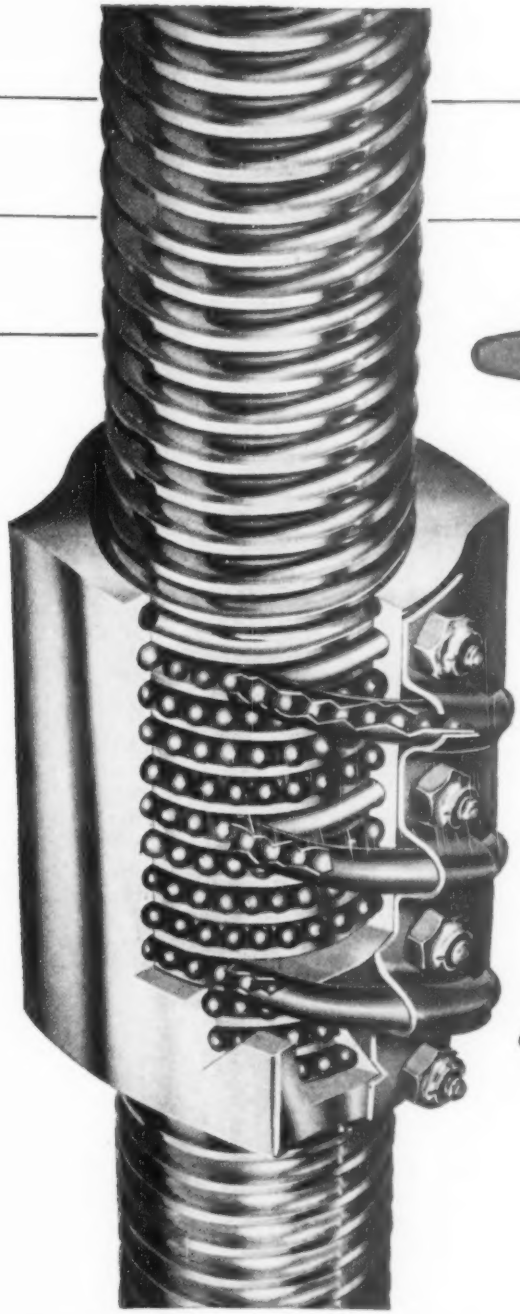
- **insured safety** In the rare event of a ball-failure, in a multiple-circuit Saginaw Screw, only one circuit is inactivated, and the other circuits "carry on".

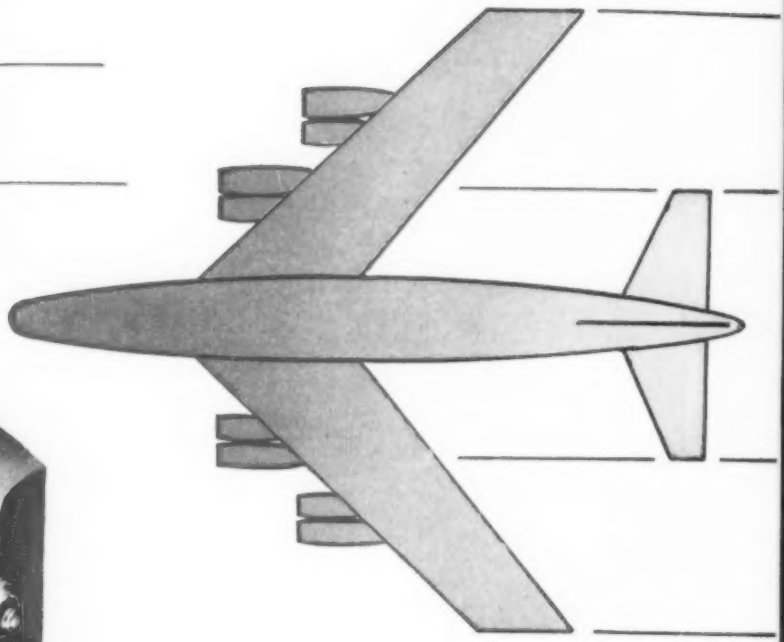
- **experience for you** The Saginaw Steering Gear Division pioneered in the development of the recirculating ball-nut screw. The continuous research and development of the engineering staff is available to help you increase the dependability and efficiency of the actuators in your product, and to cooperate with you on any new applications you may have.

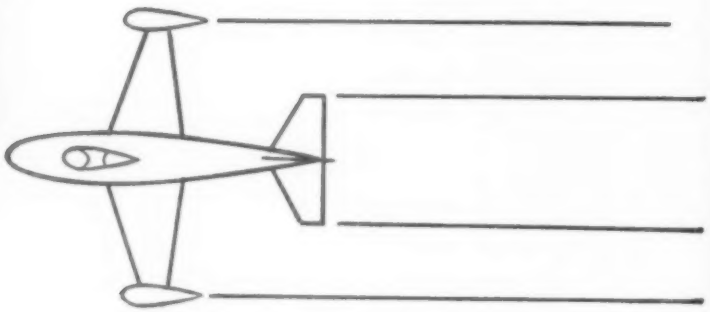
Saginaw Screws can be supplied in 1, 2, or 3 circuits and in a complete range of load and life requirements for use with electrical, hydraulic or pneumatic units. Write today for our free engineering data book.

Saginaw STEERING

multiple circuits...







GEAR DIVISION

GENERAL MOTORS CORPORATION • SAGINAW, MICHIGAN
MANUFACTURERS OF SAFETY POWER STEERING

ADVANCE *builds 'em for heavy loads and long service!*

Cramped quarters don't cramp the style of ADVANCE midgets and miniatures. You can use them on loads up to 5 amperes continuously... and at three times their rating intermittently – with complete safety. They'll resist shock and vibration... stand up under temperature extremes. You'll find them readily adaptable to any mounting need... any type of duty. Here are a few examples:

"TINY MITE"

MM & MP SERIES

This ultra-small d-c relay occupies less than ½ cu. in. mounting space! It's stable under vibration and shock ...plated to prevent corrosion. Operate time is 5 milliseconds. Contact rating: .5 amp. or 1 amp.

MINIATURE TELEPHONE TYPE

TQ SERIES

Only .94 cu. inches in size, yet this relay carries 5-amp. loads in any combination up to 4 PDT. Mechanically secured throughout, it's extremely efficient. No gassing or bubbling. Withstands 10G vibration. Temperature range: −55° to +125° C.

Hermetic enclosures on these types are impervious to varying climatic conditions... are sealed and carefully checked against leakage.

Write for literature on any of the above series, or the complete ADVANCE line.

ADVANCE ELECTRIC AND RELAY CO.

2425-A NORTH NAOMI STREET
BURBANK, CALIFORNIA

Sales Representatives in Principal Cities of U.S. and Canada

perature nuclear combustion reactions are compared with combustion reactions at varying pressures. Energy radiation, ionization and enthalpy considerations are examined. Three possible uses of enthalpy of nuclear combustion gases are presented.

▶ **Thermal Dissipation of Meteors by Bumper Screens**—By N. H. Langton, Leicester, England.

A study is made of the transformation of kinetic energy into heat caused by the impact of meteorites of varying sizes and velocities striking a thin protective bumper shell surrounding a space vehicle. A one-millimeter-thick screen would apparently be adequate for most meteors, which are preponderantly extremely small in size.

▶ **The Return of Winged Vehicles from Satellite Stations**—By H. J. Kaeppeler and M. E. Kuebler, Stuttgart.

This paper presents the analysis of a return from a satellite orbit divided into a braking trajectory, approach ellipse and a gliding descent in the earth's atmosphere. Lift and drag coefficients, stagnation pressure, retardation maxima and appropriate maximum skin temperatures in the gliding descent are developed analytically with the solution of the equations of motion.

▶ **Analysis of Orbital Systems**—By Krafft A. Ehricke, Bell Aircraft Corp., Buffalo, N. Y.

Orbital-supply systems of load- and passenger-carrying vehicles are studied for systems with altitudes of 120-150 mi. for temporary transfer points, 360-400 mi. for translunar points, 500-700 miles for observational satellites and 30,000-40,000 miles altitude for departure and arrival of planetary expeditions.

▶ **Possibilities of Electrical Space Ship Propulsion**—E. Stuhlinger, U. S. Army Ordnance Missile Center, Huntsville, Ala.

Although a typical space ship of 270 tons with a 50-ton payload would experience the small acceleration of 0.00004 G using an electrical propulsion power plant, the ship would travel a distance of 114 million miles in one year from zero relative velocity in a terrestrial orbit.

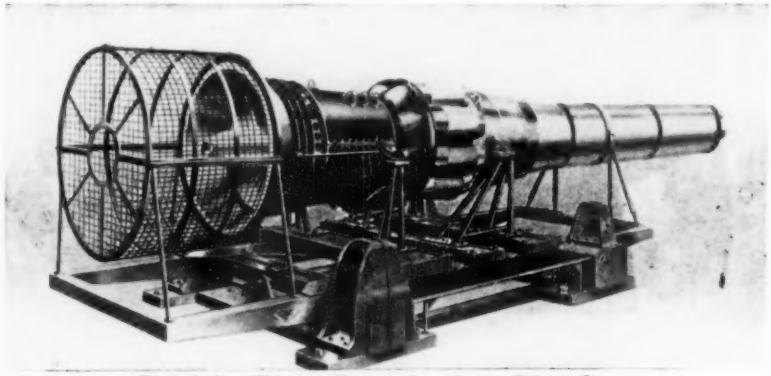
The system is based on a lightweight metal such as caesium or rubidium. The propellant is vaporized and then ionized by passing it across platinum foil heated to incandescence. The ionized particles are then accelerated through a magnetic field.

Solar radiation, chemical combustion and an atomic pile are examined as methods for the production of power. The solar powerplant, consisting of mirrors, a high-pressure boiler using diphenyl as a fluid, and a turbo-electric generator, is called the best choice.

▶ **Complexity**—One observation that was appointed the fifth JAF Congress was the increasing complexity of astronautics. Until recently one could, with a little study, understand reasonably well the major known scientific and technical barriers to space flight. A similar condition existed in the U. S. guided missile field immediately after the war when various aviation companies were setting up their guided missiles organizations. At that time, group and project leaders could keep pace without difficulty with the progress of their subordinates in attacking the problems of guided missile structures, aerodynamics, propulsion, guidance and control and servicing.

So much progress has been made so rapidly, however, that the day of the generalist has disappeared except in administrative or executive positions. At the Innsbruck congress, the majority of the papers presented were exceedingly advanced and complex.

This professional sophistication is a clear indication that astronautics is coming of age as a science.

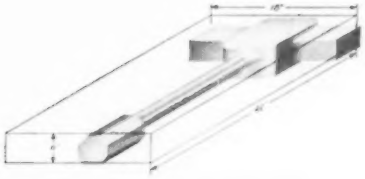


British Test Stands for Big Jets

A jet engine test stand which can take powerplants up to 15,000 lb. thrust and is transportable was shown this month at the Society of British Aircraft Constructors 1954 Flying Display at Farnborough. Manufacturer is Heenean & Froude, Ltd., Worcester, England. The test stand is designed to handle nearly every type of aircraft turbine.

Producing a large contour hand forging on a 660-ton press. Bridgeport can make contour forgings up to 1,000 pounds.

BRIDGEPORT CONTOUR HAND FORGINGS —for lighter, stronger parts at lower cost



See how much metal and machining are saved by using a contour hand forging instead of a solid slab from which a machined part would be made. The physical properties of the forging are far superior, too.

Bridgeport's Forging Folder describes the advantages of forgings in many applications. Write or call for your copy.

Aluminum and magnesium contour hand forgings offer a number of savings in terms of die costs, time and materials over other methods of producing a limited number of units—especially for experimental and prototype use.

Bridgeport Contour Hand Forgings have these advantages:

1. Save metal and reduce machining.
2. Grain in forged metal more closely follows contour of part, giving more strength.
3. Furnished in T-6 condition, in most cases ready for machining.
4. X-ray, zyglo and ultrasonic testing of every forging assures highest quality.
5. Inventory of aluminum or magnesium forging alloys available for fast production.

Bridgeport's skilled know-how and modern forging facilities with press sizes up to 16,500 tons also assure quality die forgings. For prompt, dependable service on all types of forgings, call your nearest Bridgeport Sales Office.

BRIDGEPORT BRASS COMPANY

ALUMINUM DIVISION—BRIDGEPORT 2, CONNECTICUT

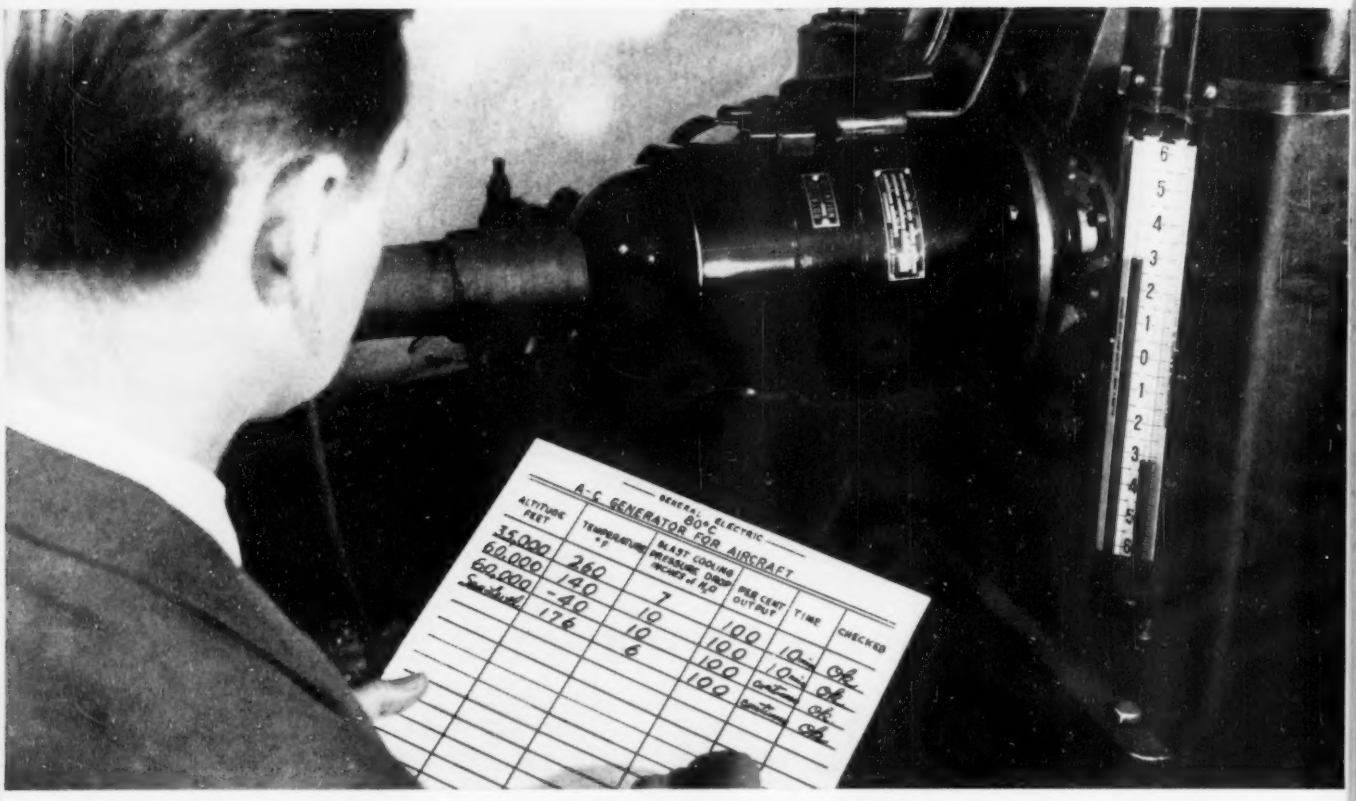
Sales Offices in Principal Cities—Conveniently Located Warehouses

Mills at Bridgeport, Conn., Indianapolis, Ind., and Adrian, Mich.

BRASS Bridgeport CO.

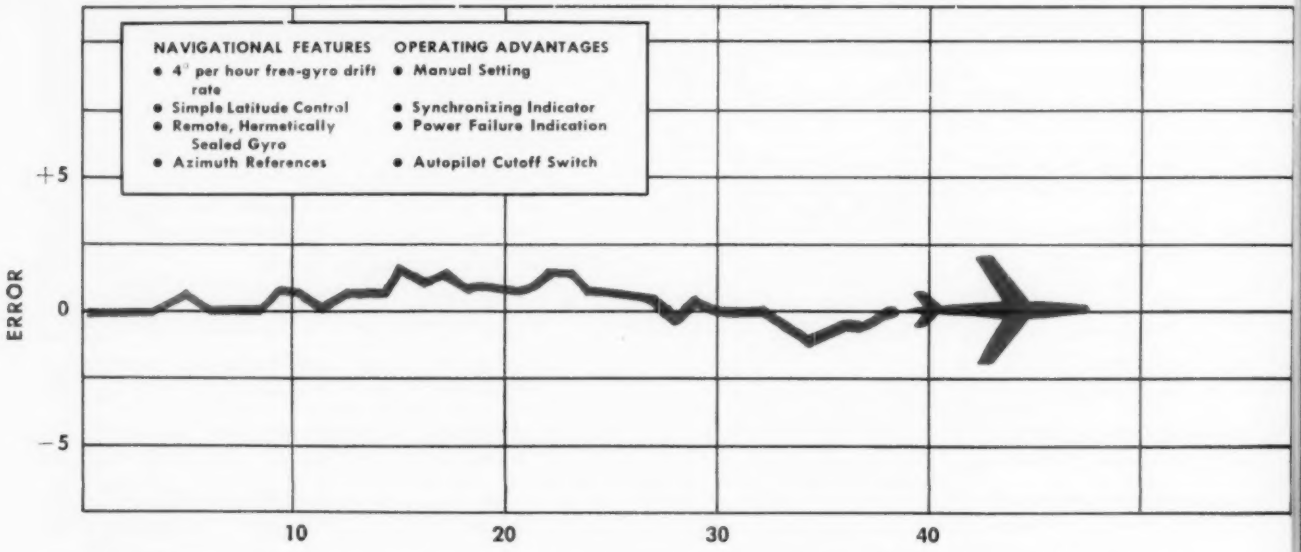
BRIDGEPORT ALUMINUM

New G-E automatic a-c electrical system



New G-E high-efficiency a-c generator has no harmonic over 1%, and offers full load recovery in about 1/10 sec. Available ratings: 10 to 60 kva, 380/420 cycles, 5700/6400 rpm, 120/208 volts.

New G-E compass system reduces aircraft



Low drift of gyro system proved in laboratory and flight tests. The above drift curve was obtained during a roll-pitch-yaw test on a G-E gyro unit. This test, conducted by an outside equipment laboratory, showed that at no time did the drift rate exceed 4° per hour—66–80% reduction over previous systems. Flight test conducted later upheld the laboratory findings.

delivers load at 260F

A new, fully automatic parallel a-c electrical system which eliminates normal manual switching, and delivers rated load at higher ambient temperatures than ever before possible, has been developed for jet aircraft by General Electric.

Designed for supersonic dash

Designed specifically to meet the high ram-air temperatures of supersonic dash, this new G-E generator system provides the best voltage regulation and most advanced system protection available in production today. The automatic system delivers full load at:

- Sea level with 176 F cooling air at 6-inch water drop (continuous).
- 60,000 feet with −40 F cooling air at 10-inch water drop (continuous).
- 60,000 feet with 140 F cooling air at 10-inch water drop (ten minutes).
- 35,000 feet with 260 F cooling air at 7-inch water drop (ten minutes).

Speeds take-off, spares pilot

The first completely automatic a-c system ever produced, the new G-E equipment begins operating as soon as the pilot starts an engine. The system contains only two toggle switches, which can remain "on" at all times unless a fault develops. This eliminates a series of pilot functions, and sharply reduces time required to become airborne after the pilot climbs into the cockpit. System control and protection is fully automatic.

Single source for complete systems

General Electric offers a single source for complete a-c or d-c power generation systems for any aircraft. For more information, contact your nearest G-E aviation specialist, or write Section 210-86, General Electric Company, Schenectady 5, N. Y.

Major components of the new G-E system in addition to the generator are:

1. **New static regulator (left)—designed to last the life of the aircraft though regulator is only 390 cubic inches and weighs only 13 lbs.**
2. **Control and protective equipment (right) automatically locates and isolates any faulty generator. Control panel weighs only 8½ lbs. for a single-generator system and only 10¼ lbs. for parallel generator systems.**

drift rate 66 — 80%

A new compass-controlled directional gyro system which offers a free-gyro drift rate of only 4° per hour—66 to 80 per cent more efficient than present systems—has been developed by General Electric for helicopters and fighter aircraft.

Weighs only 17.5 lbs.

Compact and lightweight (approximately 17.5 lbs.), the MA-1 compass system is designed to meet the requirements of any synchronous course-indicator, and will operate from all compass transmitters built to Air Force specification AF-27635.

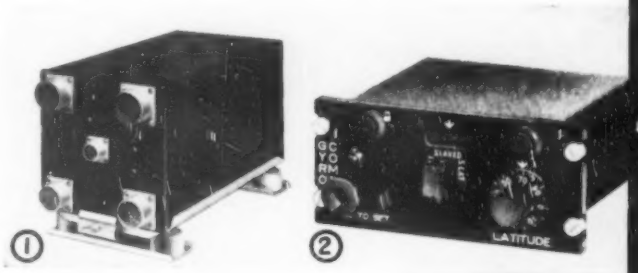
Accurate, stabilized heading information

The MA-1 system offers accurate, stabilized heading information continuously through 360° in azimuth when slaved to the earth's magnetic field through a modern remotely mounted compass.

Featuring a normal slaving rate of approximately 2° per minute during compass-controlled operation, the MA-1 system also provides for controlled latitude-drift compensation.

Aircraft systems development

For additional information regarding reliable aircraft systems development, contact your G-E aviation specialist or write Section 210-86A, General Electric Co., Schenectady 5, N. Y.

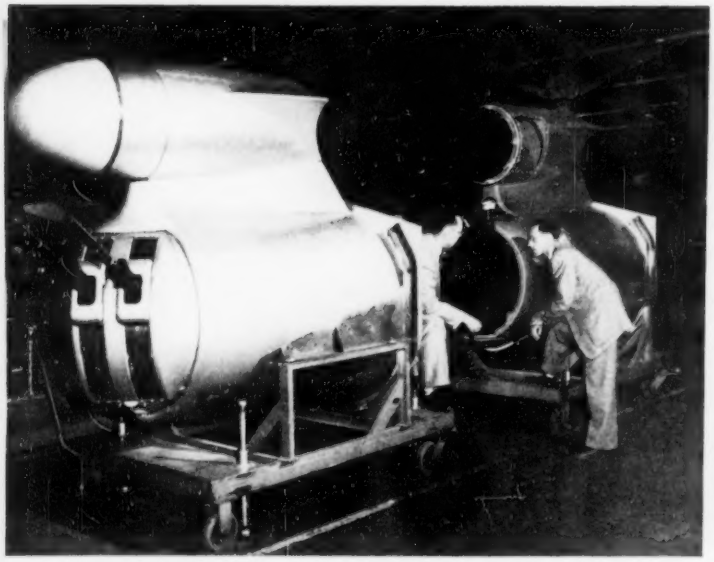


1. **Amplifier provides a junction box for various components and power source as well as containing leveling, slaving and servo amplifiers, servo unit with detector, follow-up and output synchros.**
2. **Controller is used in conjunction with the radio-magnetic indicator for setting directional heading and latitude control and for general operation of the system.**
3. **Directional gyro, heart of the G-E system, is a remote, low-drift hermetically sealed gyro used to obtain a stabilized azimuth heading.**

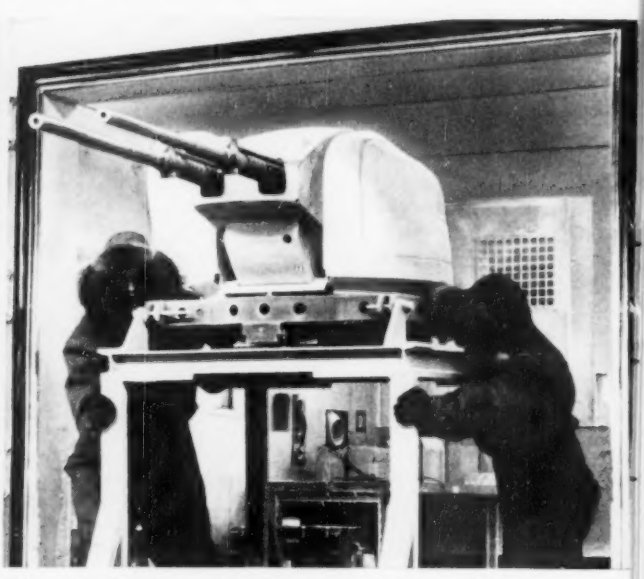
Progress Is Our Most Important Product

GENERAL ELECTRIC

New G-E armament system gives jet bombers

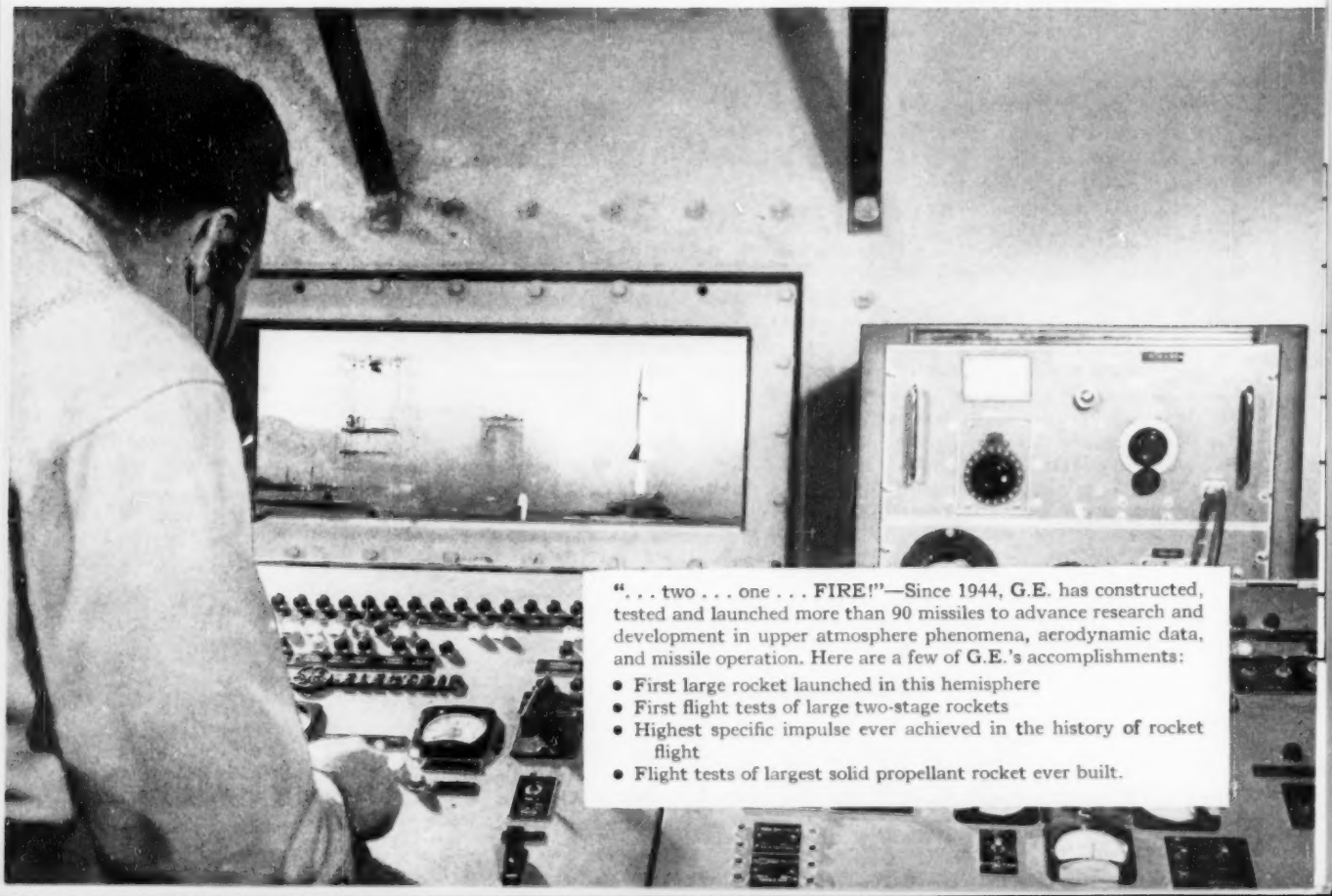


This new 20 mm system is a result of G.E.'s "integrated system" approach whereby a group of engineers is responsible both for development and modification of a system for greatest efficiency and ease of maintenance.



Cold and hot chambers with temperatures ranging from −90 F to 170 F are only two of the elaborate tests G-E armaments systems undergo to help insure maximum flight efficiency.

New land-sea-air uses for rocket propulsion



". . . two . . . one . . . FIRE!"—Since 1944, G.E. has constructed, tested and launched more than 90 missiles to advance research and development in upper atmosphere phenomena, aerodynamic data, and missile operation. Here are a few of G.E.'s accomplishments:

- First large rocket launched in this hemisphere
- First flight tests of large two-stage rockets
- Highest specific impulse ever achieved in the history of rocket flight
- Flight tests of largest solid propellant rocket ever built.

automatic defense

A remote-controlled 20 mm armament system, capable of finding, tracking and hitting hostile aircraft even in the night or fog, has been developed by General Electric for high-speed jet bombers.

"Packaged" protection for B-47E and RB-47E

Under security wraps for three years, the G-E fire control system provides more reliable, automatic protection for the Boeing B-47E and RB-47E jet bombers. Compact, the 20 mm system is delivered packaged, tested, and ready to be installed as a complete tail section.

Automatic warning, tracking, correcting

The system performs the following functions:

- Provides automatic radar warning of approaching aircraft
- Automatically tracks and positions guns on selected target
- Continuously corrects for windage, ballistics, and lead errors by means of an electric computing network
- Fires guns electrically when target is in range.

System Engineering

Bomber survival is increased as a result of this integrated, effective, compact system. Competent system engineering is one reason why almost every U.S. operational heavy and medium bomber today is equipped with General Electric armament systems. General Electric Company, Schenectady 5, N. Y.

Remote-controlled G-E armament system gives the Boeing B-47E and RB-47E jet bombers a heavyweight punch to the rear. Guided by radar, the 20 mm system can track and hit unseen targets.

under study by G.E.

Ten years ago, rocket propulsion had but one use . . . to launch missiles. But today, rocket power as a source of high pressure, high speed, high temperature gases and power can be used in such applications as torpedo propulsion, catapult energizers, high-speed flight, thrust augmentation, rocket booster and sustaining power, high-speed research sleds, glider take-off and landing, supersonic wind tunnels, mining, plus many additional latent military and industrial uses which will be brought out by research and development.

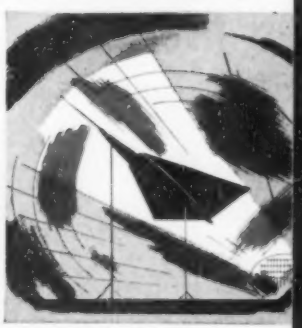
Experience, manpower and facilities make it possible for G.E. to design and develop rocket motors or rocket propulsion systems for use on land, sea or in the air.

The amazing growth of rocket propulsion offers a challenge to the ingenuity and imagination of American industry. This challenge—to apply the tremendous power of rocket propulsion to ever-newer applications—can be met only through continuous research and development. To this end, General Electric offers its successful experience, its trained manpower, and its extensive facilities. General Electric Company, Schenectady 5, N. Y. 210-86B

TORPEDO PROPULSION

THRUST AUGMENTATION

MINING



SUPERSONIC WIND TUNNELS

Progress Is Our Most Important Product

GENERAL ELECTRIC

Allison Streamlines J33 for Matador

• Piloted-plane engines also benefit from tricks learned in converting jet for one-shot missile use.

Missiles and their power plants, because they are one-shot items, should combine material and production economy, but at no sacrifice in top operational reliability.

This pattern was followed in the design of the Martin B-61 Matador (AVIATION WEEK Oct. 5, 1953, p. 28) and was rigidly applied to the powerplant for this missile—the J33-A-37—by Allison Division of General Motors Corp.

▶ **Worthy Ancestor**—Although designed for expendability, this centrifugal-flow turbojet is engineered for 100% reliability during its short flight life.

It is a special modification, for missile power, of the basic, service-proven Allison J33, which has racked up more than 2½ million flight hours in such planes as Lockheed's F-80, T-33 trainer, and F-94A night fighter and Grumman's F9F-3, -4, and -7.

A J33 also powers Chance Vought's surface-to-surface missile—the Regulus—and another missile, the details of which have not yet been cleared for publication.

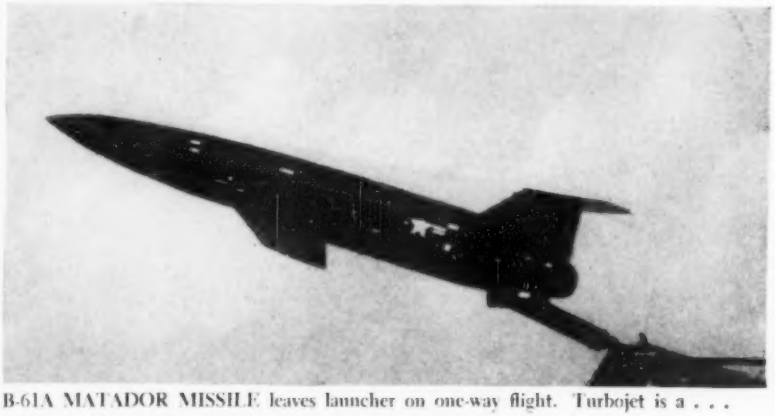
▶ **Change Benefits**—For the missile assignment, Allison engineered a J33 featuring reduced material, manufacturing and testing costs, while maintaining complete reliability. This special program brought these outstanding results:

- **Major changes in basic engine design.**
- **Cost reduction of 30%.**
- **Critical materials reduced 85%** in comparison with the J33 built for piloted aircraft.

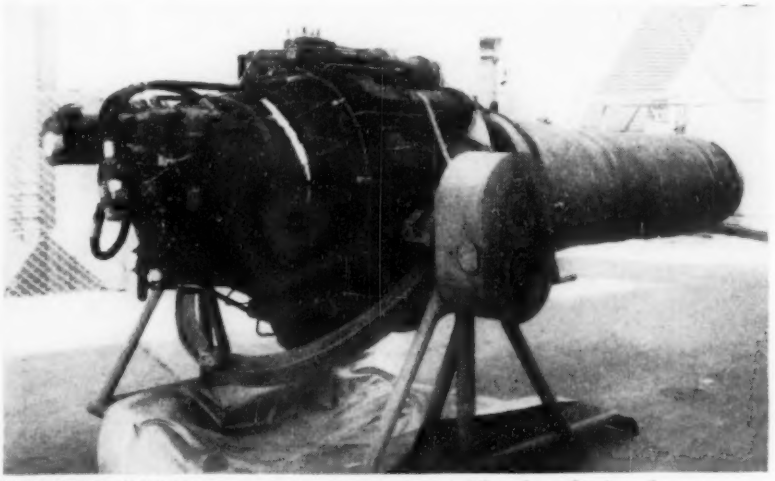
Finally, Allison was able to apply successfully to its piloted turbine engines some of the processes and materials conceived in the development of the missile engine.

▶ **Better Buckets**—A new material for turbine buckets was developed by General Motors Research Laboratories. A cast alloy capable of operating at temperatures at least 100F higher than the forged material previously used, the new GMR 235 has afforded a considerable reduction in critical metal use.

The missile engine was the first production application of the material. It is now released for use in all Allison turbojet and turboprop engines.



B-61A MATADOR MISSILE leaves launcher on one-way flight. Turbojet is a . . .



MODIFIED J33-A-37, incorporating important material and production changes.

▶ **Protective Coatings**—Another development that helped to cut critical material use in the missile engine is an aluminum dipping process, perfected in cooperation with General Motors Research.

The process is applied to the inner combustion liners, which are made from a low alloy steel instead of Inconel, a critical material. The aluminum dipping gives corrosion protection, permits the liners to withstand combustion chamber temperatures.

Allison, which claims to be the first to apply aluminum dipping equipment to large parts, now uses the process on turbine engines scheduled for piloted aircraft.

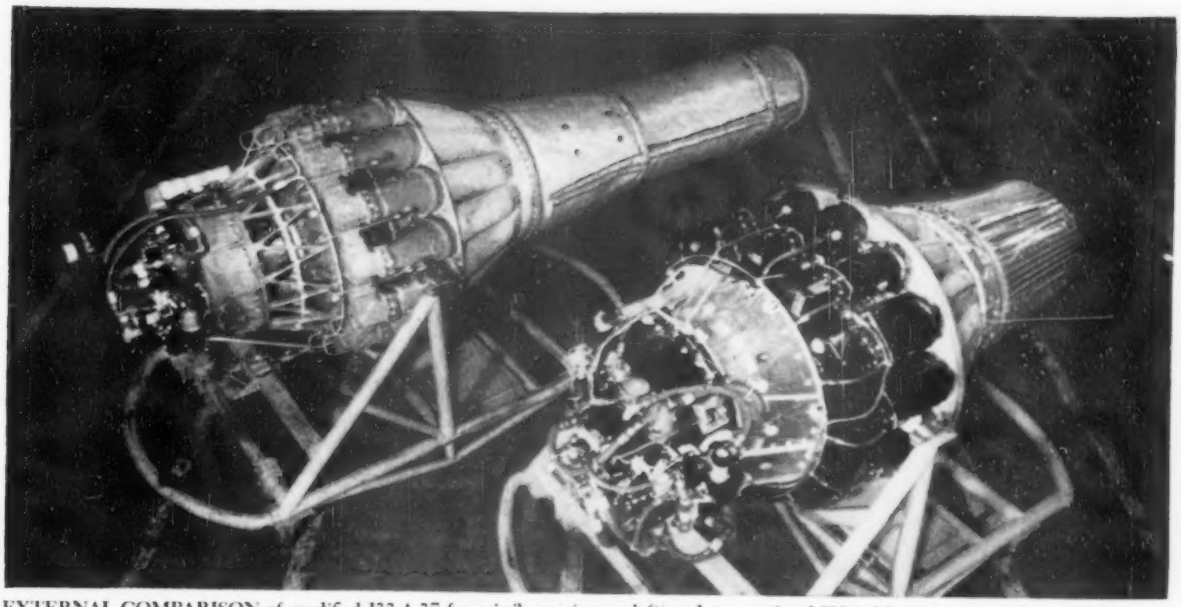
Aluminum painting and aluminum metal-spraying also would provide sufficient surface protection for non-critical materials during engine operation, Allison found. Almost all the stainless steel in the combustion section of the missile engine was replaced by relatively inexpensive low-grade steel. A low-carbon steel treated with heat-resistant paint is used in the engine's ring and tube assembly.

Research proved that less critical materials could replace critical steel in the piloted version as well as in the missile engine.

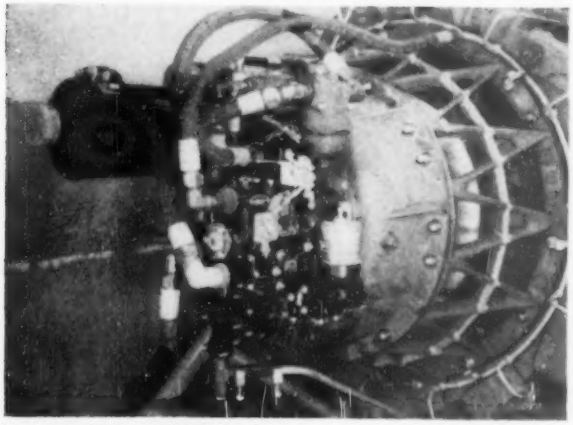
▶ **New Exhaust Section**—Allison also designed and developed, at Martin's request, a one-piece exhaust cone and tailpipe of aluminum-coated, low-carbon steel capable of withstanding temperatures up to 1,350F. This combination unit is adjusted to hold engine temperature within a 30-deg. range.

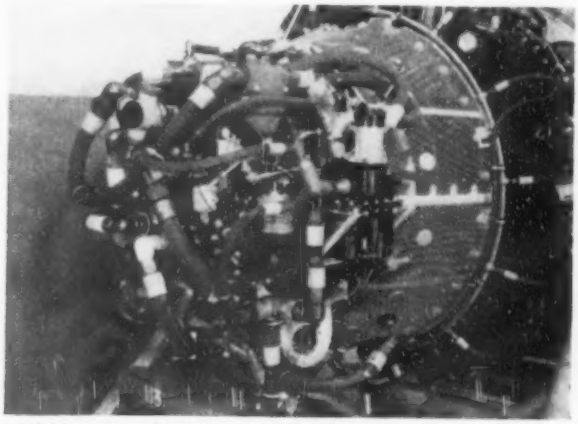
It is shipped directly to the point of usage, whereas with the piloted version of the J33, the airframe manufac-

How Missile Engine Compares With Conventional J33 . . .

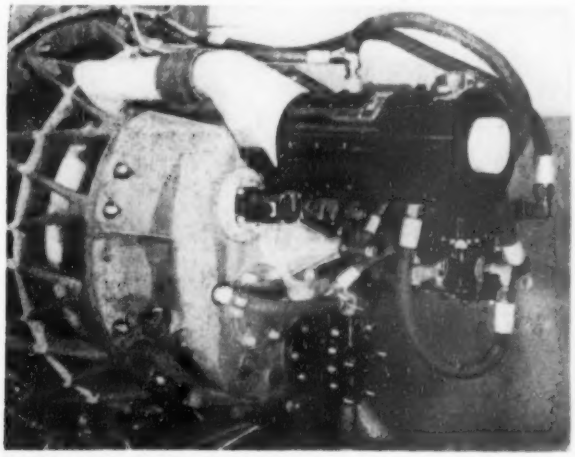


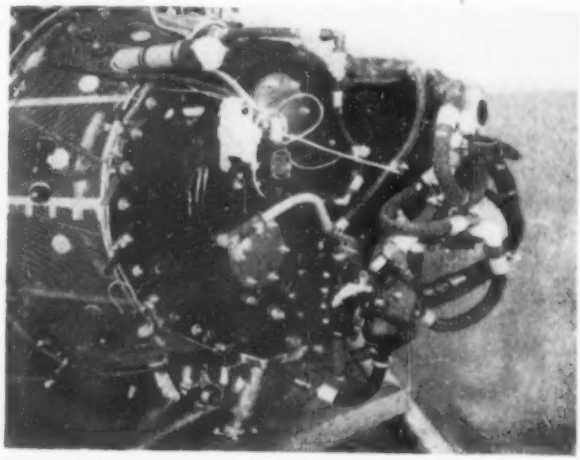
EXTERNAL COMPARISON of modified J33-A-37 for missile use (upper left) and conventional J33-A-35, latest version for piloted planes.





FEWER ACCESSORIES and hoses mark nose section of missile engine (left) compared with more complex piloted-plane J33 (right).





WEIGHT SAVINGS on missile engine, left (normal J33, right), include use of single starter-generator; deletion of inlet screens.

turer supplies, fits and adjusts separate exhaust and tailpipe units fabricated of stainless steel.

The program even included modification of the insulation blanket. Previously this was constructed of an expensive grade of asbestos with a solid Inconel foil binder. It was replaced with an inexpensive asbestos filler and a stainless steel wire screen binder.

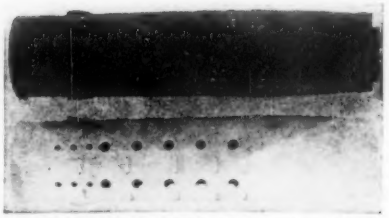
▶ **Shop Time Saved**—Big savings were effected in manufacturing and assembly:

- **Dimensional tolerances were relaxed.**
- **Machining time and man-hours** were cut to a minimum.
- **A 50% reduction** was made in the number of studs and bolts joining compressor and accessory sections.
- **Screw bushings** were eliminated in magnesium components.
- **Bearing races** were piloted directly into the magnesium housing, thus eliminating steel bearing cages in the accessories gear case.
- **All painting** for appearance purposes was discontinued.

▶ **Not Needed**—All components not required for a short life engine were removed. A weight saving of 33 lb. is realized by using a single starter and generator, eliminating the starter gear train and clutch.

Starting fuel control and ignition unit has been removed from the engine and relocated on the missile launcher.

Emergency fuel system and air inlet screens have been removed from the engine.



COMBUSTION LINER before (top) and after aluminum dip.

▶ **Test Time Reduced**—The test program, too, introduced worthwhile savings.

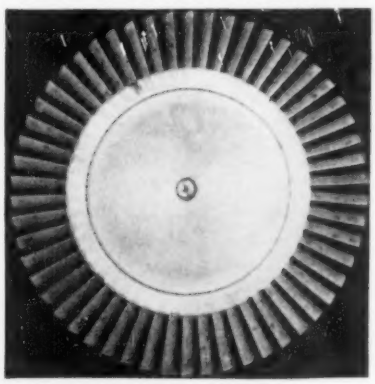
Normal requirement for a piloted engine—150-hr. qualification test—was whittled to one 5-hr. model test on three different engines, for the missile powerplant.

Acceptance testing of production engines was sliced from 6 hr. of initial and final time to 1½ hr. of final test only.

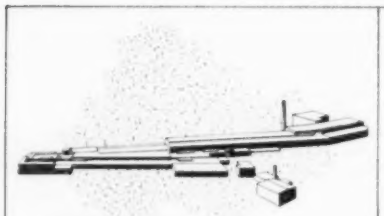
▶ **Compatibility Kit**—The final acceptance test on the missile engine is set up in two phases. One is to demonstrate performance; the second phase is to check the operation of a Martin kit. This is an engine build-up preparation kit consisting of those items normally installed by the airframe manufacturer before engine installation. Included are the hydraulic pump, throttle actuator, hydraulic hoses, brackets, fuel hoses, drain lines, electrical harness and disconnect units.

Allison installs and tests the components of the Martin kit. Thus, the accepted missile engine may be shipped directly to the operating organization for field assembly by enlisted personnel, bypassing the shipment to the airframe manufacturer.

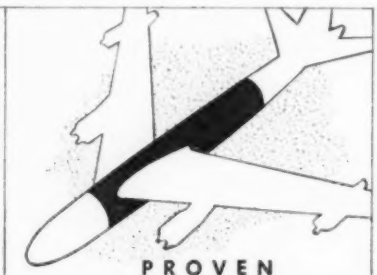
▶ **Begun in 1950**—Development of the engine was undertaken by Allison in October 1950, when Martin, under contract with the USAF, asked for a



CAST ALLOY buckets take higher heat than forged types.



MANUFACTURING FACILITIES

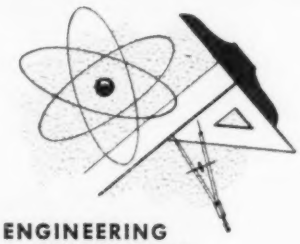


PROVEN ABILITY

OLIVER

AVIATION

A Fast Growing Name in the Aviation Industry



ENGINEERING KNOWLEDGE

PRODUCTION SKILL

Complete Brochure On Plant Facilities Available Upon Request

THE OLIVER CORPORATION

AVIATION DIVISION

110 SOUTH McCAMLY STREET

BATTLE CREEK, MICHIGAN

OTHER PLANTS: Battle Creek, Michigan; Charles City, Iowa; South Bend, Indiana; Cleveland, Ohio, Be-Ge Mfg. Co., Gilroy, California; A. B. Farquhar Division, York, Pennsylvania; Springfield, Ohio; Shelbyville, Illinois.

THOUSANDS OF DOLLARS SAVED YEARLY BY OUR NEW SPARE PARTS PLAN

Modern technical research puts spare parts stocking on a scientific basis... reduces your present inventories by 65% without affecting operations.

If you are concerned with the operation or financing of an airline or overhaul shop, this new approach will save you money. There is no magic in the method. It merely establishes two levels of parts stocking, then transfers the second level so that the parts are held for you . . . but *not with your capital or occupying your warehouse space!*

It takes a month of technical studies by a trained team of parts supply technicians to establish proper spare parts levels . . . *but that costs you nothing!* Your lead time will be reduced as our inventory takes over. For example, we reduced the lead inventory time from 120 days to 60 days for one of the leading airlines without creating a single operational delay. Within a few months, that lead time was further reduced to 30 days . . . releasing capital for other uses while *increasing their security of supply.*

AIRWORK technicians have the background needed for a survey of this type. We are one of aviation's major engine and engine driven accessory overhaul bases. We live with the problem of spare parts inventory . . . maintaining a million dollar revolving inventory at all times. We know what shelf-life deterioration means. And what a shelf-bound inventory costs in terms of idle capital.

To put it bluntly, it is profitable for us to save money for you. Our technical studies produce a provisioning plan that lets you keep a minimum parts investment. But it also shows just how much we need to carry to meet your maximum demands.

AIRWORK, with its own stock for overhaul needs, plus the demand from organizations such as yours, then acts as a central spare parts bank. You can draw at any time from this bank . . . from our warehouses in Washington, Millville, or Miami. The practical effect is a type of *spare parts insurance policy* where the varying stock needs of all types of customers are equalized through combination. The central stock is smaller . . . is always fresh . . . and always adequate . . . yet never costs more than you now pay for each item!

We would like to sit down with you and talk over the details of our spare parts supply plan. Our method of saving your money is simple, uncomplicated, easy to explain—backed with success stories. Give us just 15 minutes of your time to prove it. Why not call or wire AIRWORK at Millville, Washington, or Miami today?

Airwork
CORPORATION
Millville, New Jersey

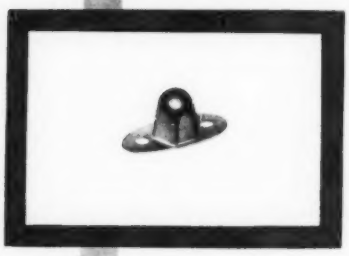
NEW YORK • MIAMI • WASHINGTON

this nut
may solve
your
fastening
problem

NS-110 Stainless steel 1-8, self locking, floating anchor nut.

or

you
may need
this one



4605-40 steel #4-40 self locking fixed dome nut.

Self locking anchor nuts are solving many complex fastening problems, especially where corrosion, vibration and high temperatures exist. Whether your application requires a standard or special type, we can supply it in steel, stainless steel, titanium or aluminum; thread sizes 1-8 to 4-40. **Write for booklet, SOLUTIONS TO FASTENING PROBLEMS on your company letterhead.**

Nutt-Shel

811 AIRWAY, GLENDALE 1, CALIF.

MANUFACTURERS OF SELF LOCKING ANCHOR NUTS & BOLT AND NUT RETAINERS.

5-hr. (test plus flight), low-cost expendable jet engine.

Awarded a development contract in March 1951, Allison completed test of three prototype missile engines in September, began production in December 1951.

First flight of the production Matador with the engine was at Patrick AFB in November 1952.

Development of the J33-A-37 is still continuing. Allison is now shipping engines to the first pilotless jet bomber squadron in western Europe.

Irving Stone

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

Aerosonic Instrument Corp., 3703 Lonsdale, Cincinnati 27, Ohio, altimeter, 538 ea., $96,356.

Ford Motor Co., Aircraft Engine Div., 7401 Cicero Ave., Chicago 29, aircraft engines, 104 ea., 299 ea., $92,598,272.

Allison Division, General Motors Corp., Indianapolis 6, turbojet engines, 466 ea., spares 255 ea., $40,001,800; turbojet engine special tools, 201 ea., $4,668,200.

American Instrument Corp., 1500 South Broadway, Los Angeles 15, dryer, 185 ea., instruction books, 153 ea., spare parts, $62,209.

American Optical Co., 14 Mechanic St., Southbridge, Mass., lens, 500 ea., $252,835.

Bausch and Lomb Optical Co., 635 St. Paul St., Rochester, N. Y., lens, 900 ea., technical assistance, $373,800.

Boeing Airplane Co., Seattle 14, mobile trainer, $714,194.

Canadian Commercial Corp., Ottawa, Ontario, Canada, airplanes, spare parts, special tools, $85,172.

Cessna Aircraft Co., Wichita, facilities for the production of aircraft, $25,000.

Cochran Foil Co., Inc., 1430 South 13th St., Louisville 10, Kentucky, chaff, 36,000 cartons, 20,068 cartons, $3,175,943.

Chicago Aerial Survey Co., 1980 North Hawthorne Ave., Melrose Park, Ill., magazine aircraft camera, 29 ea., spare parts, cial tools, $585,172.

Continental Aviation and Engr. Corp., 1500 Algonquin Ave., Detroit, engines, 2 ea., $49,052.

Continental Motors Corp., Muskegon, Mich., Packette engines, 570 ea., $2,613,929.

Convair Div., General Dynamics Corp., San Diego, aircraft, spare parts, special tools, 21 ea., $13,382,790.

Crosley Div., Avco Mfg. Corp., Concinnati 15, radio set, 733 ea., $1,463,353; facilities for prod. and testing of armament systems, $300,000.

Cruver Mfg. Co., 2460 Jackson Blvd., Chicago, models for aircraft recognition, $39,-226.

Curtis Laboratories, Inc., 2718 Griffith Park Blvd., Los Angeles 27, lens, 270 ea., $143,100.

Douglas Aircraft Co., Inc., 3000 Ocean Park Blvd., Long Beach, Calif., aircraft, spares, $11,523,683; facilities for the production of aircraft, $2,334,133.

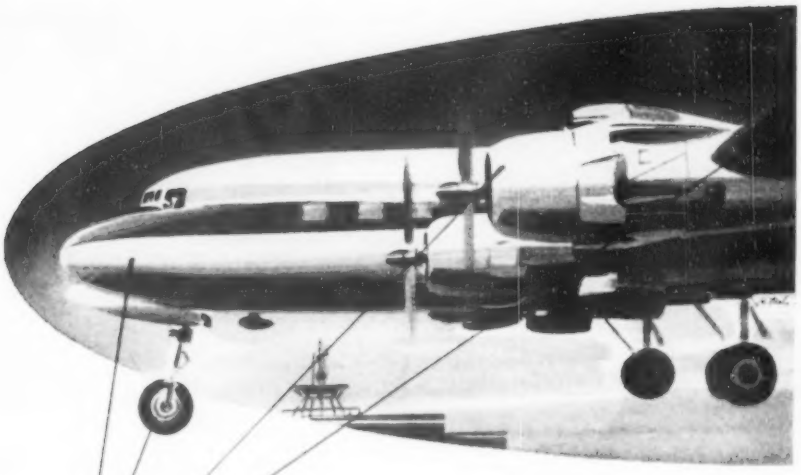
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., special tools and test equipment, $31,520.

Electro Plastic Fabrics, Inc., 64 First St., N. E., Pulaski, Va., tow target, 1,805 ea., $32,490.

Ellis and Watts Products, Inc., 215 East Second St., Cincinnati, dehumidifier, 50 ea., spare parts, $56,865.

Engineering Research Corp., Box 209, Hyattsville, Md., simulators, 7 ea., data, spare part, $3,856,000.

Fairchild Aircraft Division, Fairchild Engine & Airplane Corp., Hagerstown, Md., facilities for use in production of aircraft, $40,600.



BREEZE ACTUATORS REALLY ACT!

If it's for today's high performance aircraft, it *must* work with positive action . . . with precision. That's the whole story of actuators by BREEZE.

Years of specialization in electrical, mechanical and hydraulic actuating devices have made BREEZE a recognized leader in the design and manufacture of actuators. Leading aircraft manufacturers continue to depend on BREEZE mechanisms for actuating landing gear, trim tabs, wing flaps, engine air throttle, pilots' seats, cowl shutters, antennae and other functions requiring positive motion control.

Breeze has available many standard actuators to meet your requirements, and an experienced staff ready to submit new designs for special applications.

BREEZE

CORPORATIONS, INC.
700 Liberty Ave., Union, N. J.

OTHER [redacted] PRODUCTS

WELDED METAL BELLOWS • AERO-SEAL HOSE CLAMPS
RADIO IGNITION SHIELDING • FLEXIBLE METAL TUBING

Conquers Heat, Erosion and Corrosion. Stainless steels containing nickel lengthen life expectancy of various components used in severe service. For instance, Diesel engine turbocharger rotors. Some rotors operate at from 12,500 to 21,000 r.p.m., and at temperatures upward of 1000°F. The rotor comprises a slotted disc of chromium-nickel stainless steel, with inserted blades of the same material . . . to take the brunt of attack in converting heat into mechanical power. Type "19-9" stainless, containing molybdenum and tungsten additions, is used to make sure of high tensile strength and low creep at the high temperatures encountered. And a somewhat similar austenitic chromium-nickel stainless steel . . . 18-8-S-Mo . . . is used for turbine nozzle blades

STAINLESS PROVIDES THE ANSWERS . . .

Thousands of designers and engineers have found austenitic chromium-nickel stainless steels to be the key to new high standards of product performance and minimum operating costs. You, too, may find that a stainless steel containing nickel will help solve *your* metal problem.

1. At Elevated Temperatures

Stainless steels of this type possess the two essential qualities for successful use at elevated temperatures. By virtue of the chromium content, and assisted by the nickel content, they have outstanding resistance to scaling and oxidation. The nickel content also results in high creep strength and stress-to-rupture properties. Combined, these properties permit use of chromium-nickel stainless even in thin sections required for lightweight design.

2. At Sub-Zero Temperatures

Experience has shown that unalloyed steels become embrittled rapidly as temperature is lowered below normal. Nickel is by far the best alloying element to prevent brittleness. At sub-zero temperatures, chromium-nickel stainless steels provide unsurpassed impact values. These steels retain such a high level of toughness that they are known to be useful at temperatures as low as −400°F. and possibly even lower.

3. Under Corrosive Conditions

Selection of exactly the right alloy for your specific needs may be made from some thirty alloy steels qualified to carry the family name "Stainless." By virtue of their strength and resistance to attack by chemicals and atmospheres over a wide range of concentrations and temperatures, these austenitic chromium-nickel steels assure not only longer life of the equipment and purity of product, but also permit decrease of bulk and deadweight without sacrificing safety.

4. Where Erosion Is A Problem

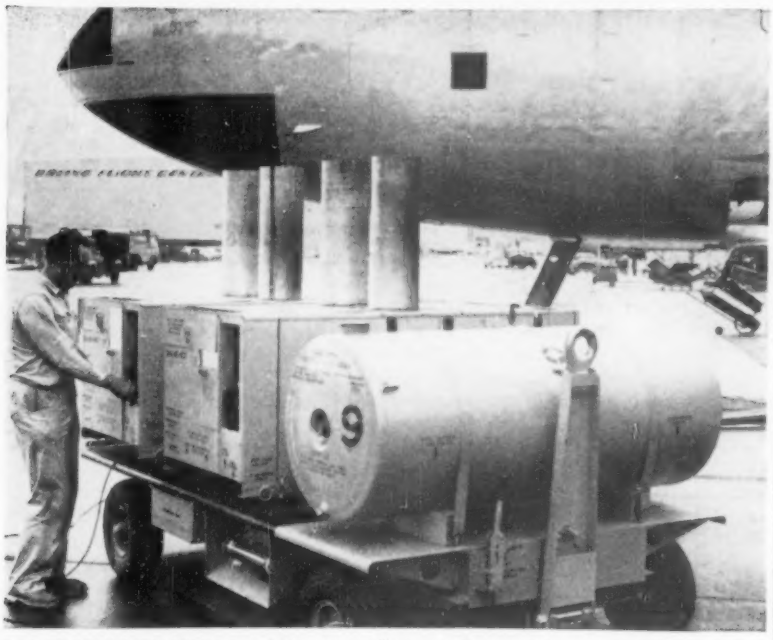
Chromium-nickel stainless offers the utmost in resistance to erosion and cavitation. By cold working, it is possible to increase the tensile strength to as much as 300,000 psi. When subjected to erosion, the erosive media work hardens the surface and, correspondingly, curbs the attack. This resistance to erosion combined with corrosion resistance results in prolonged life for equipment made from the chromium-nickel stainless steels.

5. Use *Stainless* To Meet Complex Requirements

Utilize the unique combination of properties provided by chromium-nickel stainless steels when designing new products or improving old ones. You can draw, spin, forge, weld, solder, punch, shear or bend chromium-nickel stainless steels. Leading steel companies produce these austenitic alloys in all commercial forms. A list of sources of supply will be furnished on request.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.



GAS TURBINE STARTER for B-52 utilizes Boeing 502s supplying compressed air.

How Bomber Jets Get Their Start

First details of two new ground engine starters for Boeing's speedy, turbojet-powered bombers, the B-52 Stratofortress and the B-47 Stratojet, have only recently been announced. Although of completely different concept, they program roughly the same functions.

• **The B-52 unit,** manufactured by Boeing, furnishes pneumatic power to start the bomber's eight Pratt & Whitney Aircraft J57s. Compressed air comes from a compressor driven by a Boeing-built 502-series gas turbine engine. The portable machine, called an "air supply cart," also furnishes compressed air to test the aircraft's pneumatic system. The portable air compressor has passed an official 200-hr. Air Force qualification test run, according to the manufacturer.

• **Second system** is a diesel-powered electrical group which provides both power to start the B-47's six General Electric J47 turbojets plus single- and three-phase, 400-cycle alternating current to maintain, service and calibrate the large quantities of avionic equipment aboard the aircraft.

System will also take current from commercial source instead of the diesel-driven generator if available. It is the result of a joint effort by three manufacturers—Marathon Electric Manufacturing Co., successful bidder on over 150 B-47 ground support systems, who enlisted the help of Electric Service En-

DIESEL-POWER STARTER for B-47 has three units, also serves avionic gear. Right to left: 1. diesel set, 2. four-circuit cabinet, 3. trailer with rectifier.

When a measured delay is required in sequencing an electronic control system, Tarrytron thermal time delay offers a practical and economical solution.

Qualified to MIL-R-6106 by Inland Testing Laboratories and thoroughly flight tested by practically everything that flies, Tarrytron provides a reliable, small, light weight, hermetically sealed timer.

It weighs 4½ ounces and measures 2 1/16" x 1 5/8" x 1 13/32" displacing only 4.75 cubic inches. Time Delay Range settings range from ½ to 120 seconds and can be calibrated to 28 volts DC or 115 Volts AC.

We invite your inquiry

Cook Electric Company

Established 1897

2700 Southport, Chicago 14, Illinois

Diaphlex—Aircraft Components and Accessories • **Wirecom**—Wire Communications, Protection & Distribution Apparatus • **Magnilastic**—Expansion Joints, Heavy Industry Equipment, and Airframe Structures • **Cook Research Laboratories**—8100 Monticello Avenue, Skokie, Illinois • **Inland Testing Laboratories**—1457 Diversey Parkway, Chicago 14, Illinois • **Electronic Systems Division**—2533 N. Ashland Avenue, Chicago 14, Illinois • **Subsidiary: Canadian Diaphlex Limited**—Aircraft Components and Accessories, Toronto, Ontario, Canada • **Plymold Division**—3415 Belmont Avenue, Chicago 18, Illinois.

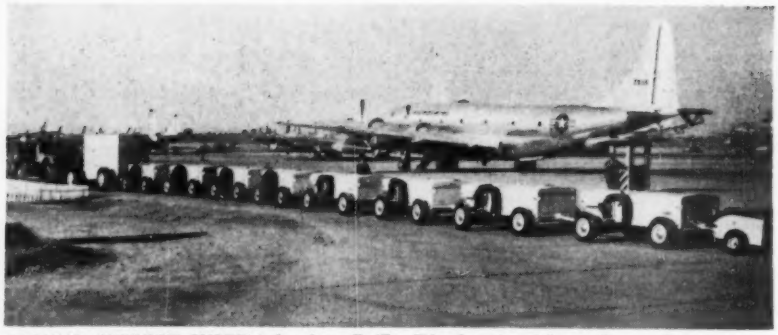
The ability to build the maximum of comfort into every type, size and style of airline and executive transport seat and berth has resulted in a growing demand for TECO seats!

Consult our Engineering Department on your aircraft seat problems — you can get top comfort and cost-saving assistance with TECO's complete manufacturing facilities.

TECO INC.

2501 No. Ontario St. • Burbank, California

Airline • Executive • Military Aircraft Seats



GROUND SUPPORT SYSTEM for four B-47s: Diesel unit, eight trailers, cabinet.

gineering Co., and the Caterpillar Tractor Co.

▶ **Stratofortress Unit**—Here are details about the Boeing B-52 unit and succeeding, more powerful machines Boeing has in the offing.

• **Current model,** designated the Boeing 502-7D, consists of two cubicle-mounted Boeing 502-series gas turbine engines, driving air compressors which deliver 140 air-hp. per unit. In the present production unit, the two compressors' output is manifolded together to produce a total of 280 air hp. The two cubicles (which are weatherproof) with fuel tank, instrumentation panels and air flow control are mounted on a trailer.

The output of a single 502-7D compressor—140 air-hp.—provides 90 lb. per minute of air at an absolute pressure of 53 psi. at a temperature of 425 deg. F.

• **A later model** air compressor built by Boeing supports the flight test program of the company's 707 jet tanker-transport prototype. Labeled the 502-11, the unit is similar to the 502-7D but has increased output. The 502-11 produces 180 air-hp.—a flow of 120 lb. of air per min. at 51.3 psi. and 420 deg. F.

• **Still another design,** the Model 502-11B, based on the improved Boeing Model 502-10 gas turbine powerplant, is in the development stage. This unit's output has been pushed to 210 air-hp.—an air flow of 141 lb. per min. at pressures and temperatures similar to those of the 502-11.

Douglas Aircraft Co. uses Boeing portable air compressors in conjunction with its RB-66 twin-jet reconnaissance planes. Northrop Aircraft has the units in service in its research and development program, according to Boeing.

To date, Boeing compressors have accumulated some 3,000 hr. of operation —equivalent to well over 6,000 jet starts, the company adds.

▶ **Stratojet Unit**—The B-47 ground support system is considerably more involved than the single-unit, single-cart B-52 unit. This is primarily because the B-47 system is designed to support four aircraft at once and also is capable of simultaneously furnishing A.C. power to the planes' electronic equipment in addition to providing power to start the engines.

The B-47 ground support system is made up of these four basic elements:

• **Diesel electric set.** This trailer-mounted unit consists of a D364, V-type diesel engine operating at 1,200 rpm. It drives a Marathon 254/440-V., three-phase, 60-cycle, 150-kw. generator. The trailer houses in a waterproof enclosure all other pertinent equipment including the radiator, fuel tank and switchgear plus winterizing provisions to handle temperatures as low as —65 deg.

The diesel engine features a Caterpillar-designed and -built injection system which permits the engine to operate at a light load (such as when providing 400-cycle current for avionic equipment maintenance) yet pick up instantaneously to full load during jet engine starts.

The diesels can run on undiluted JP-4 jet engine fuel, thus do not require their own special fuel supply. And the engines were designed for easy maintenance: Example is that all pistons and main or connecting rod bearings may be changed through inspection doors. Injection valves can be changed in three minutes and all injection valves or pumps are interchangeable and do not require balancing.

Diesel electric set control equipment and switchgear is designed and manufactured by Electric Service Engineering Co.

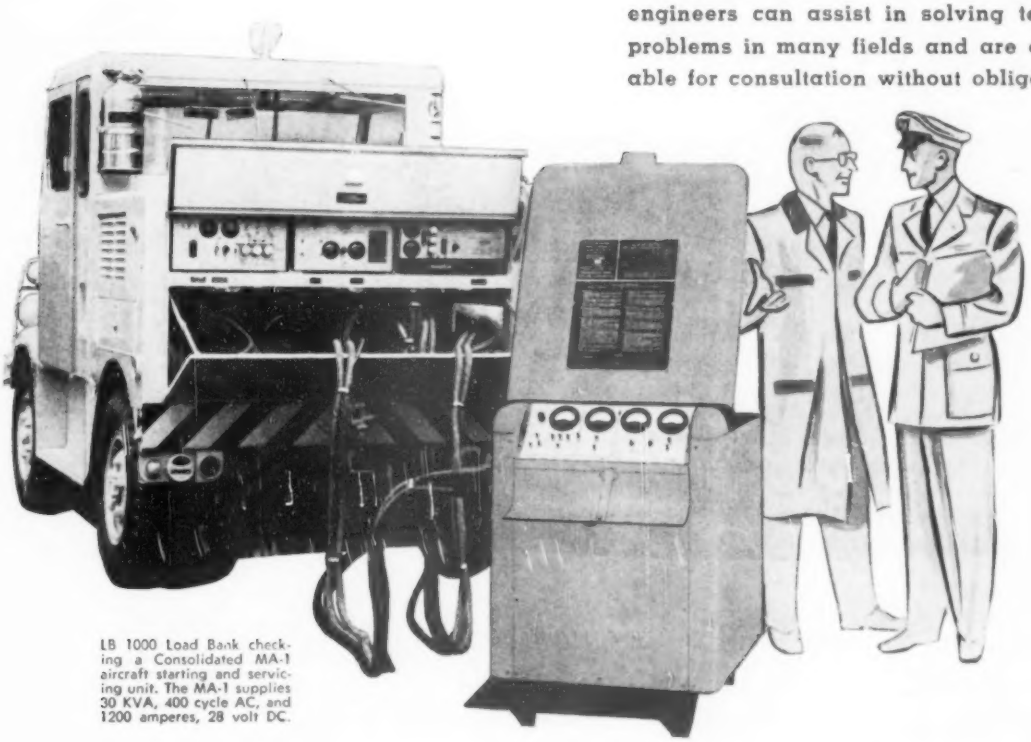
• **Distribution cabinet.** The four-circuit distribution cabinet receives electric power from the diesel electric set and distributes it to the four rectifier units and four motor generator sets, one of each of which are used with each B-47. The distribution cabinets contain all circuit breakers, control relays, control power transformers, the main bus and weatherproof plugs for cable connections. The power circuit breakers are motor operated, have a continuous rating of 150 amps, and an interrupting capacity of in excess of 25,000 rms. value. A manually operated cir-

±?

Plus or Minus errors are expensive when valuable aircraft equipment is being started, serviced, or tested. Consolidated load banks provide a wide range of protection for electrical systems and components.

Foolproof and portable, Consolidated load banks assure stable DC, and/or AC, testing for shop, field, and line. They are compact, self-contained, self-cooled, and available in many types and capacities.

Consolidated research and development engineers can assist in solving testing problems in many fields and are available for consultation without obligation.



LB 1000 Load Bank checking a Consolidated MA-1 aircraft starting and servicing unit. The MA-1 supplies 30 KVA, 400 cycle AC, and 1200 amperes, 28 volt DC.

CONSOLIDATED
diesel electric CORPORATION
AIRCRAFT EQUIPMENT DIVISION
STAMFORD CONNECTICUT

OFFICES IN • DAYTON, OHIO – B-4 TALBOTT BUILDING • **SANTA ANA, CALIFORNIA** – SPURGEON BUILDING • **WASHINGTON, D. C.** – CAFRITZ BUILDING

cut breaker is also included plus a transfer switch to allow the system to draw its power from a commercial power station.

• **Rectifier trailer.** The rectifier trailer comes complete with its own control system. The trailer incorporates all necessary rectifier stacks, instruments, switches, relays, protective devices, receptacles and power output cables to provide the d.c. power required by the airplane. The two rectifier sections are rated at 750 amps. at 28.5 v. They include magnetic amplifier-type voltage and current limit regulators and filters. A difficult task which the unit accomplishes: Output voltage, during changes from no load to full load, recovers and remains within rated value in 0.2 sec.

• **Motor-generator trailer.** This unit contains a 60-cycle, synchronous drive motor with exciter driving two 400-cycle generators mounted in a single frame. One has an output of 20-kva., 115-v., single-phase. Other's output is 3.75 kva., 115-v., three phase. The output voltage modulation of the 400-cycle generators does not exceed 1% from no load to full load. A constant voltage within +1% of the adjusted no-load voltage is supplied over the entire required range. Rheostats permit manual setting of the no-load regulated output voltage.

feet to safety

With pressure from the pilot's feet, tons of metal are brought to a fully controlled safe stop. Planes are landing faster and hotter, but with continually improved mechanisms such as Gladden's brake control units, greater power to control and stop is now possible. Gladden's ability to anticipate the requirements of the aircraft industry has made them a leader in the manufacture of brake control units. Today Gladden is in quantity production on the three major types of brake control units . . .

- Master brake cylinder
- Power boosted master brake cylinder
- Power brake valve

Over 15,000 power boosted master brake cylinders now in service.

Consult Gladden engineers on your hydraulic design problems.

POWER BOOSTED MASTER BRAKE CYLINDER

Gladden

OFFICES IN PRINCIPAL CITIES

Midwest representative:
GEORGE E. HARRIS & CO., INC.
1734 No. Hillside
Wichita, Kansas

Dallas, Texas
Kansas City, Mo.
St. Louis, Mo.
Ft. Worth, Texas
Cedar Rapids, Iowa

Eastern engineering and sales office.
509 Tasker Street
Ridley Park, Pa.

GLADDEN PRODUCTS CORP., 635 WEST COLORADO BLVD., GLENDALE 4, CALIFORNIA

WHAT'S NEW

Telling the Market

Highspeed steel straight-fluted **chucking reamers** are featured in circular distributed by Pratt & Whitney, West Hartford 1, Conn. . . . Booklet 850 lists **vibration and shock mountings for industrial applications.** Write Robinson Aviation, Inc., Teterboro, N. J. . . . **"High Vacuum Furnaces, Their Use and Application,"** is new brochure, Bulletin 790 being distributed by F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia 20. . . . **"Plant Maintenance Cleaning Guide,"** a 12-page booklet, may be secured by writing on company letterhead to Oakite Products, Inc., 157 Rector St., New York 6.

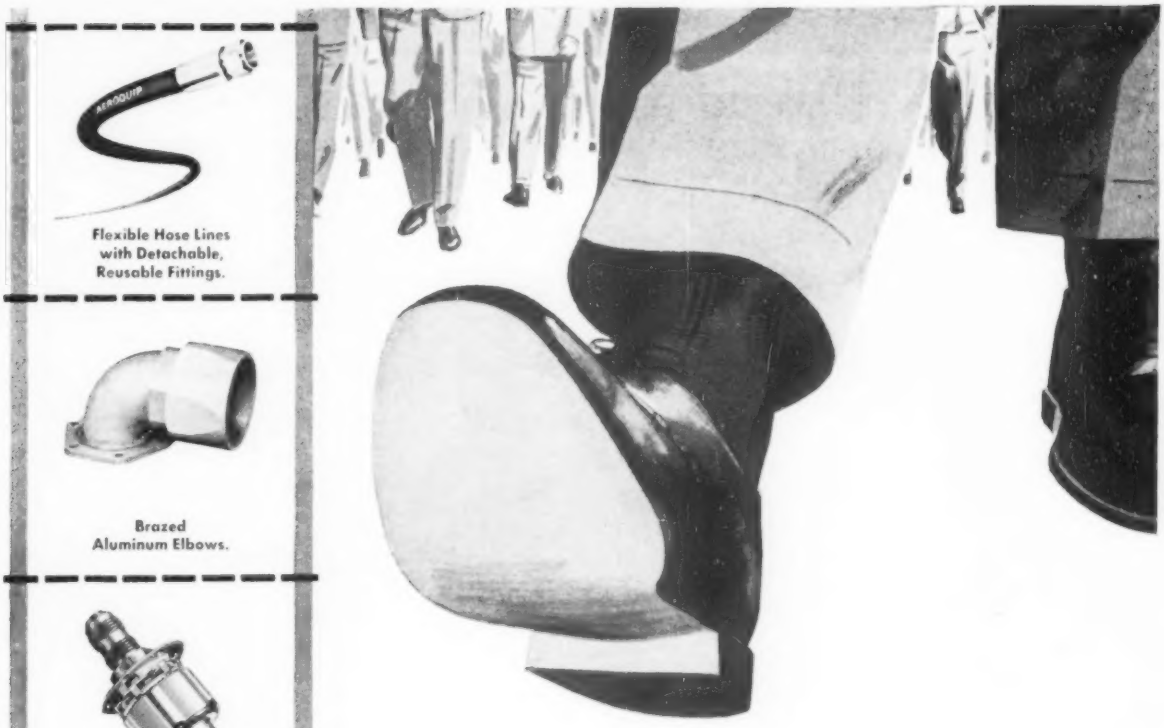
Copies of **"An Approach to Solvent Safety,"** an address given to safety engineers of the electric power industry, are being distributed by the John B. Moore Corp., P.O. Box 3, Nutley 10, N. J. . . . **"Optics Plus,"** a 64-page picture-caption book subtitled "Merging Electronics and Mechanics With Optics," may be obtained by writing on letterhead to Paul A. Wilks, Perkin-Elmer Corp., Norwalk, Conn. . . . **Diaphragm-operated (DO) solenoid valves** are covered in four-page Bulletin M-500 issued by Eclipse Fuel Engineering Co., 1012 Buchanan St., Rockford, Ill.

Publications Received

• **The Greatest Airlift—the Story of Combat Cargo,** by Capt. A. G. Thompson, USAF, 476 pages, 1,000 pictures, $3; available from Custodian, 315th Air Division Welfare Fund, APO 704, San Francisco. All profits go to the welfare fund. Capt. Thompson, former historian and PIO for the 315th, records the epic operations of the 315th and its predecessor, the Combat Cargo Command, in the Korean war. These units, commanded by Lt. Gen. William Tunner and Brig. Gen. John P. Henebry operated the largest and most intense military airlift in history during their support of both ground and air forces in the Korean war. Must reading for anybody interested in the future of airlift, both military and commercial.—RBH

• **Human Engineering Guide for Equipment Designers** by Wesley E. Woodson, Pub. by the University of California Press, Berkeley 4, Calif. $3.50. Guide is intended to aid designer in making optimum decisions wherever human factors are involved in man-operated equipment.

• **Subminiaturization Techniques for Low-Frequency Receivers,** National Bureau of Standards Circular 545, Government Printing Office, Washington 25, D. C.; 50 cents; 64 pp., 44 figures, 2 tables. Covers the second phase of a continuing program for the development of miniaturization techniques applicable to airborne military electronic equipment.



Flexible Hose Lines with Detachable, Reusable Fittings.

Brazed Aluminum Elbows.

Self-Sealing Couplings.

Silicone Hose with "little gem" Fittings.

A Step Ahead of the Crowd...

Aeroquip's position of leadership in the field of aircraft plumbing has been achieved through excellence of research, development, test, and engineering facilities. Again and again Aeroquip has demonstrated its unique ability to anticipate problems, and then, to conceive, develop, and produce the products needed to solve these problems. Start-to-finish engineering of aircraft plumbing is a *PLUS* advantage of Aeroquip's service to the aircraft manufacturer. Your inquiry is invited.

Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION; JACKSON, MICHIGAN
AERO-COUPLING CORPORATION, BURBANK, CALIFORNIA
(A Subsidiary of Aeroquip Corporation)

Manufacturers of Aeroquip Flexible Hose Lines with detachable, reusable Fittings; Self-Sealing Couplings; Brazed Aluminum Elbows

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

WESCON Unveils New Avionic Devices

• Show highlights include 440-mc. transistor, high-shock packaging, attenuator for traveling-wave tubes.

By Philip Klass

Los Angeles—A new type transistor has been operated at frequencies as high as 440 mc., several times higher than any previous transistor, opening up entirely new uses in UHF and microwave equipment, a Bell Telephone Laboratories' scientist revealed here during the Western Electronic Show & Convention (Wescon).

Another technical paper disclosed a new rugged packaging technique for avionic equipment, developed by the California Institute of Technology Jet Propulsion Lab, which enables it to withstand the high shock and vibration encountered in guided missiles.

Approximately 23,000 engineers and scientists got a look at the latest electronic wares of 600 manufacturers exhibiting in the Pan Pacific auditorium, of whom approximately 2,700 attended one or more of the technical sessions held during the three-day Wescon.

▶ **Of Avionics Interest**—Other technical papers of particular interest to the avionics field reported on:

• **Unusual type attenuator** for traveling-wave tubes (which are seeing wider use in radar and electronic countermeasures equipment).

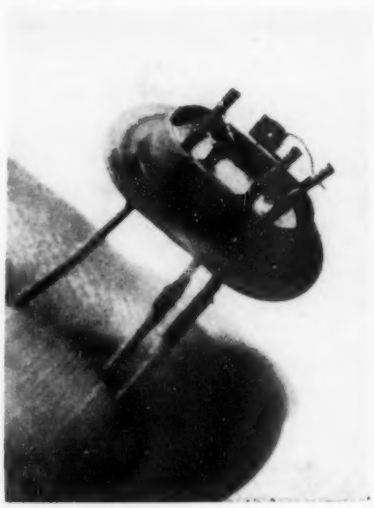
• **Radically different approach** to digital computer design, which cuts the number of components and circuit complexity by a factor of 10 or more.

• **New transistor diseases** that cause performance deterioration.

• **Temperature stabilization** techniques for transistor amplifiers, enabling them to operate over a wider range of ambient temperatures.

▶ **"Intrinsic Barrier" Transistor**—Bell Labs' new intrinsic barrier transistor, which may eventually be able to operate at frequencies up to 3,000 mc., "opens up a whole new family of junction transistor devices," Dr. J. M. Early told Wescon. The experimental transistor, which oscillated up to a frequency of 440 mc., was operated with a grounded base, Early reported.

If the conventional p-n-p transistor is viewed as a sandwich of impure germanium between two metallic pellets, then the new device is a club-sandwich with an added layer of pure (intrinsic) germanium between the (impure germanium) base and the metallic collector. It is referred to as a p-n-i-p device.



BELL LABS' new experimental ultra-high-frequency transistor is assembled in a . . .

"DRY BOX" by laboratory technicians to avoid contamination from dirt and moisture.

The intrinsic region permits faster movement of positive charges (holes), isolates the emitter and collector areas and reduces the stored energy, Early said, to make higher frequency operation possible. The p-n-i-p construction lowers collector capacitance by a factor of 10-30, he reported, and cuts the variation of collector current with temperature by roughly half. The new construction also enables the transistor to be operated at much higher voltages (up to 100 v.), thereby increasing its power handling capability.

Early cited these characteristics for one of the new p-n-i-p transistors:

• **Alpha Cutoff** Frequency: 100-120 mc.
• **Base Resistance:** 150 ohms.
• **Collector Capacitance:** 0.4 μμf.
• **Amplification Factor** (Alpha): 0.97.

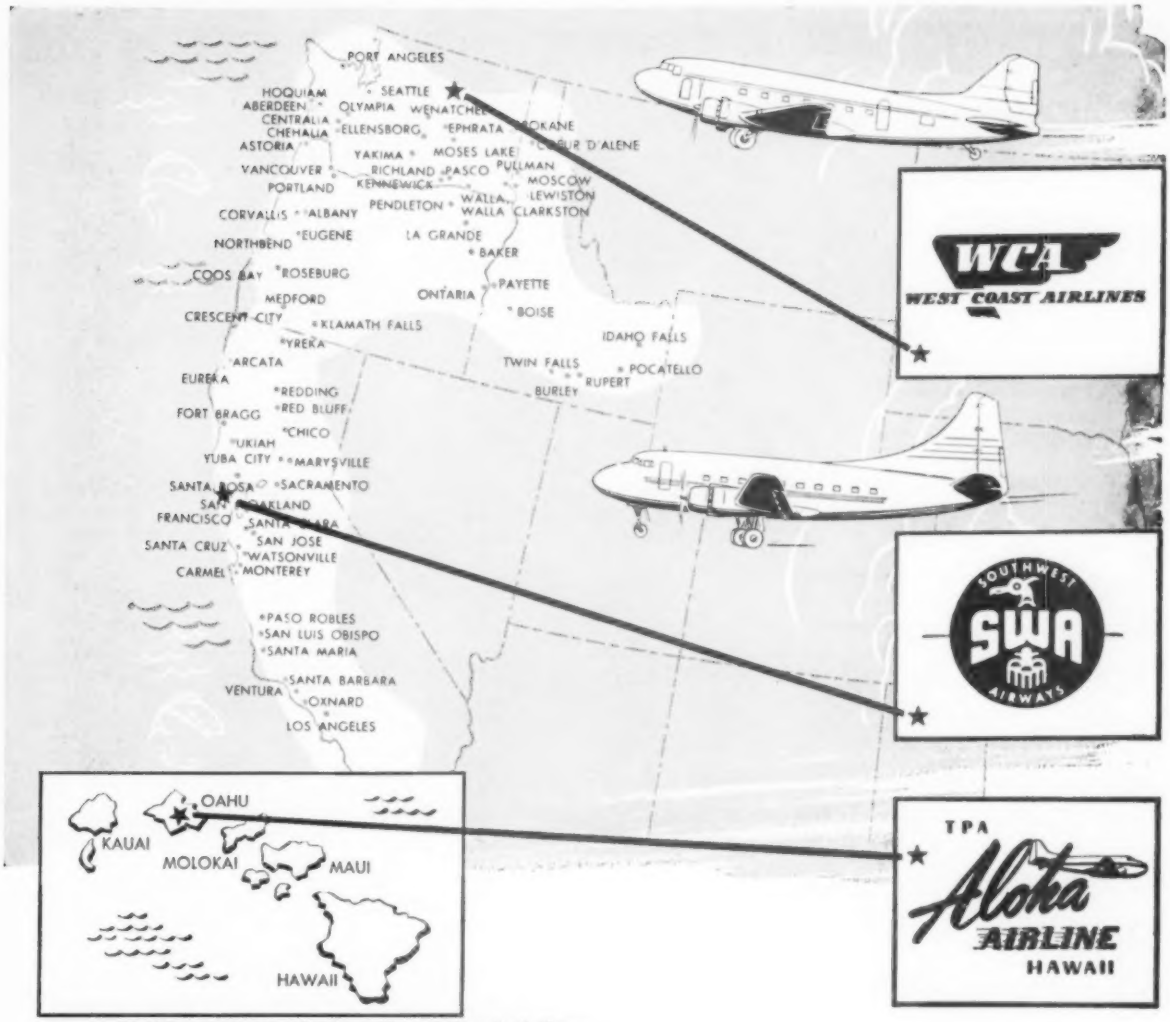
In answer to a question from the floor, Early indicated that the p-n-i-p transistor was still in the experimental stages and might not be available for several years. The p-n-i-p technique appears to be applicable to silicon as well as germanium, Early said in response to an AVIATION WEEK inquiry.

▶ **Packaging For Missiles**—Designers having trouble getting their avionic equipment to withstand the vibration encountered in guided missiles could do well to investigate a new packaging technique developed by Cal Tech's Jet Propulsion Lab and described by M. G. Comuntzis. JPL's tests indicate that avionic equipment built with this new construction can withstand up to 30Gs at frequencies of 20 to 1,000 cps., Comuntzis indicated.

Conventional avionic chassis tend to amplify vibration, by as much as 100 times, JPL tests show. One piece of avionic equipment (a radar beacon), which suffered frequent tube and soldered connection failures under 8G vibration, was found to be subjecting its components to 800Gs, Comuntzis said. When the same tubes were strapped rigidly to the vibration table, eliminating chassis resonance, they could withstand 16 to 24Gs without failure. This led to the new more rigid type of avionic chassis design.

▶ **Doughnut Chassis**—The new JPL chassis consists of a doughnut-shaped casting, with walls ½-inch thick containing holes into which the tubes are mounted. Resistors, capacitors and other components can be mounted on curved terminal strips mounted along the inner periphery of the doughnut, or on circular boards which cover one end. (See photo, p. 72.) Several such chassis can be stacked and secured by means of through bolts. The resulting assembly has a natural frequency in excess of 5,000 cps., preventing resonances at vibration frequencies normally encountered.

▶ **Test Results**—The beacon suffering frequent failures under 8G vibration was fabricated using the JPL rigid chassis, with no change in electrical circuitry, and subjected to several hours of vibration. At 16Gs, 20 to 1,000 cps., there were no failures, Comuntzis reported. At 24-30Gs, the only failure occurred above 500 cps. in a coaxial



These Pacific Coast and Hawaiian Island airlines make over 800 takeoffs and landings every day . . .

all three get outstanding service with AEROSHELL OIL

THE ENGINES in local service airlines are subjected to the toughest kind of operation. Southwest Airways, West Coast Airlines and TPA Aloha Airline are good examples . . . they make over 800 landings and takeoffs daily.

Short hops require that the engines frequently alternate between full throttle and idle. This service calls for an oil that can *take it* . . . that can operate with the high lubrication efficiency that gives low engine wear. That's why so many local service lines certificated by C.A.B. depend upon AeroShell Oil.

SHELL

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

CHECK LIST

POROUS STAINLESS STEEL

for

- ☑ Boundary Layer Control
- ☑ De-Icing
- ☑ Transpiration Cooling
- ☑ Hydraulic Filters
- ☑ Instrument Breather Vents
- ☑ Fuel Filters

Engineering data 70A sent on request

Aircraft Porous Media, Inc.

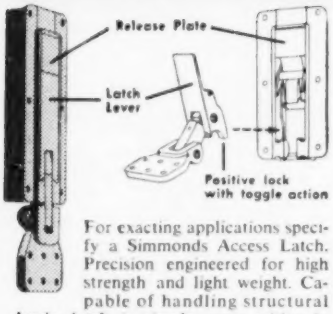
91-F Sea Cliff Ave. PALL Glen Cove, N. Y.

The Pall Filtration Companies

Micro Metallic Corporation | Porous Plastic Filter Company | Aircraft Porous Media, Inc.

Flush Fitting, Toggle Action

ACCESS LATCH



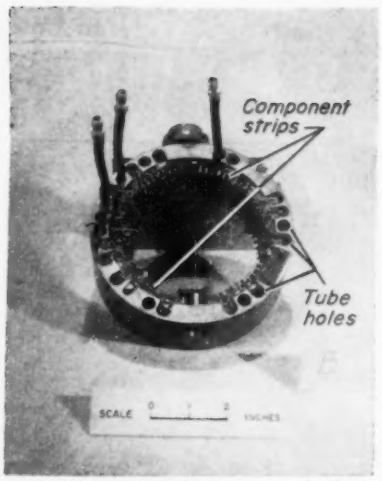
For exacting applications specify a Simmonds Access Latch. Precision engineered for high strength and light weight. Capable of handling structural loads, latch is simple, yet positive in action, both opening and closing at a touch. Body tested for ultimate loads up to 3000 pounds. For easy installation (flush) in panels, cargo doors, radomes, etc. Special adjustment features. If your latch problem is exacting, write for design portfolio on the complete line of Simmonds Structural Latches.

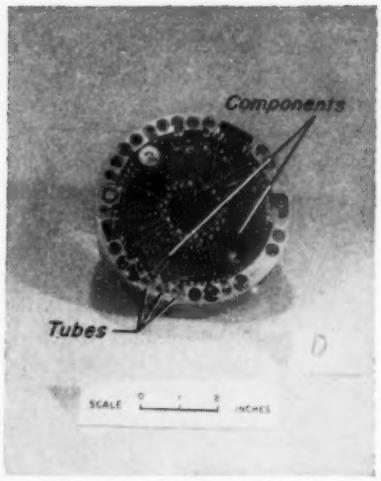
SIMMONDS

AEROCESSORIES, INC.

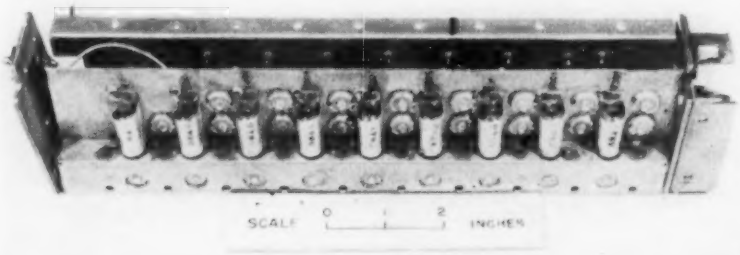
General Offices: Tarrytown, N. Y.

Branch Offices: Glendale, Cal. • Dallas, Tex. • Dayton, Ohio
Sole Canadian Licensee:
Simmonds Aerocessories of Canada Limited – Montreal





DOUGHNUT CHASSIS of these individual sub-assemblies are designed to withstand vibration. Tubes are mounted in outer shells, components inside in strips or boards.



CONVENTIONAL CHASSIS for avionics tends to amplify vibration up to 100 times.

connector. When this connector was replaced, the unit operated at 24-30Gs, 20-1,000 cps. without failure. The lack of solder connection failures indicates that this type malfunction is caused by conventional chassis flexure, Comuntzis believes.

▶ **Other Advantages**—The new rigid chassis has other advantages:

• **Smaller Size, Weight.** The weight of the original device was cut from 17½ lb. to 13 lb., by converting to the rigid chassis construction. Size was cut from 600 cu. in. to only 300 cu. in.

• **Improved Cooling.** Rigid chassis provides excellent conduction paths for removing heat. In the device tested, maximum hotspot temperature was cut from 210F to 150F by repackaging, Comuntzis reported. In addition, there were more uniform temperatures throughout the assembly.

Persons desiring more information on the technique may direct their inquiries to Comuntzis at the Jet Propulsion Lab, 4800 Oak Grove Drive, Pasadena, Calif.

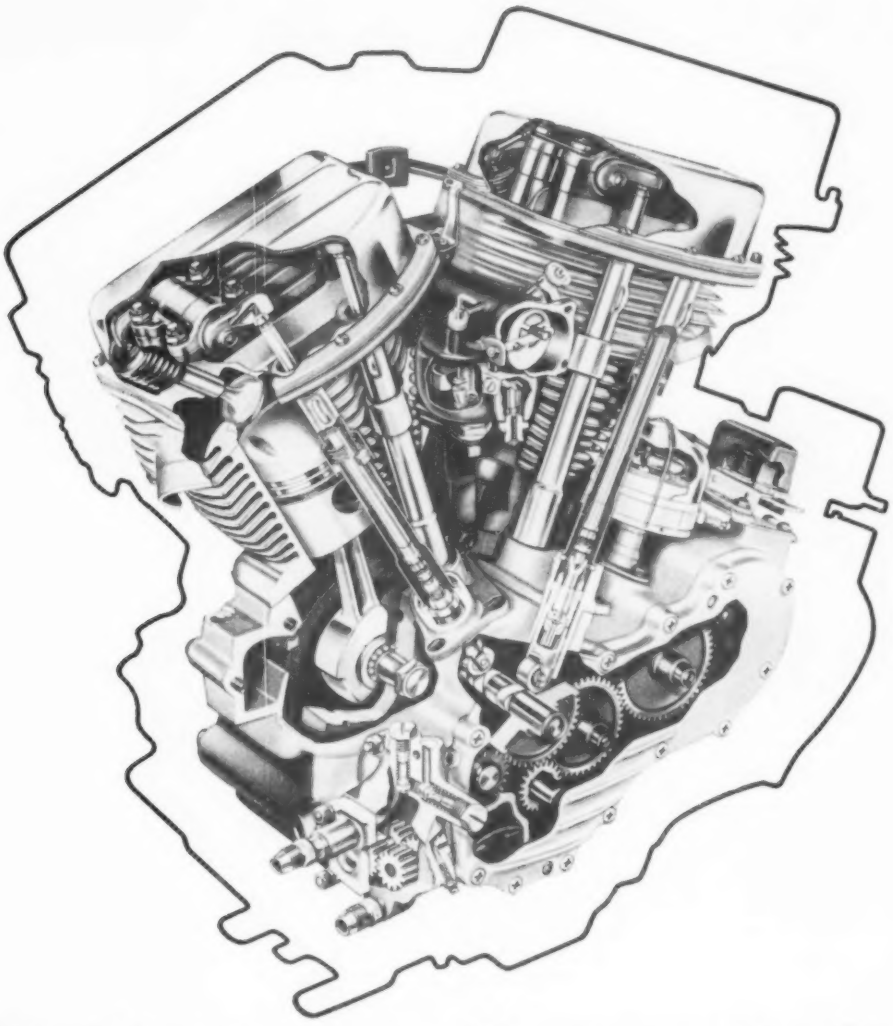
▶ **Traveling Wave Attenuator**—Ferrites, one of the recently developed materials finding wide avionic application, has been successfully applied to the troublesome problem of preventing feedback between input and output in traveling-wave microwave tubes. J. S. Cook of Bell Labs described the use of a ferrite helix (10 turns/inch) which is placed around the regular helical winding to increase attenuation in the back direction without serious loss of gain.

Cook reported that an experimental traveling-wave tube using a ferrite helix exhibited a gain of 28 db., a forward attenuation of 10 db., of which 6 db. was due to the tube's helical winding, and a backward attenuation of 60 db.

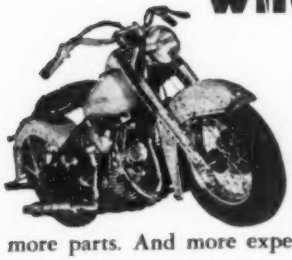
▶ **Chopping Computer Complexity**—A 20-integrator digital differential analyzer, using only 14 tubes and 180 diodes (plus power supply), occupying a space of only one cubic foot, was described by Floyd Steele, head of Digital Control Systems, Inc. (Steele was one of several Northrop engineers who developed the Maddida digital analyzer, later formed Computer Research Corp.)

By making the magnetic memory drum perform functions previously requiring tubes and diodes, and by use of multiplexing (time sharing), Steele said that digital computer size, complexity, and presumably cost, could be greatly cut, possibly by a factor of 10 or more.

Using these techniques, Steele said



What happens to the transmission when horsepower goes up?



Harley-Davidson faced the problem when it increased horsepower from 30 to 55. In a motorcycle, it usually means a bigger transmission. More steel. Maybe more parts. And more expense.

Company engineers, with the help of Republic metallurgists, took a good look at alloy steels. They chose Republic's 8617 for a lot of reasons. One of them was the reduction of section possible. Another was the good heat-treating and carburizing properties. Still another, it stood up well under the heavy strain of gear teeth.

And, most important, the transmission could stay the same size and still take tremendous impact and stress.

Get an idea from this? Lots of manufacturers have. Like Harley-Davidson, they looked into Republic Alloy Steels. Some of them cut costs. Others made better products. Others got a better competitive position. You can do the same. A call to your nearest Republic Sales Office is all it takes to get started.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC ALLOY STEELS

Marked for Life

WITH

Metal-Cal

The Ultimate in Labeling

U. S. Relay Co. has standardized on one method of product identification... Metal-Cal, the label which passes all environmental tests with flying (and permanent) colors. Acid, abrasion and corrosion resistant... usable from −62°F to +300°F... Metal-Cals are the most economical means of permanent identification.

Metal-Cals

come in a variety of colors — matte or shiny finish — any size or shape.

Metal-Cals

adhere permanently to any smooth surface—flat or curved—without screws or rivets.

Metal-Cals

assure legibility of the finest lettering or diagrammatic detail.

Write for FREE SAMPLE
TEST the advantages of METAL-CAL

Metal-Cal

Manufactured by C & H Supply Co.
415 E. Beach Avenue, Inglewood 3, California

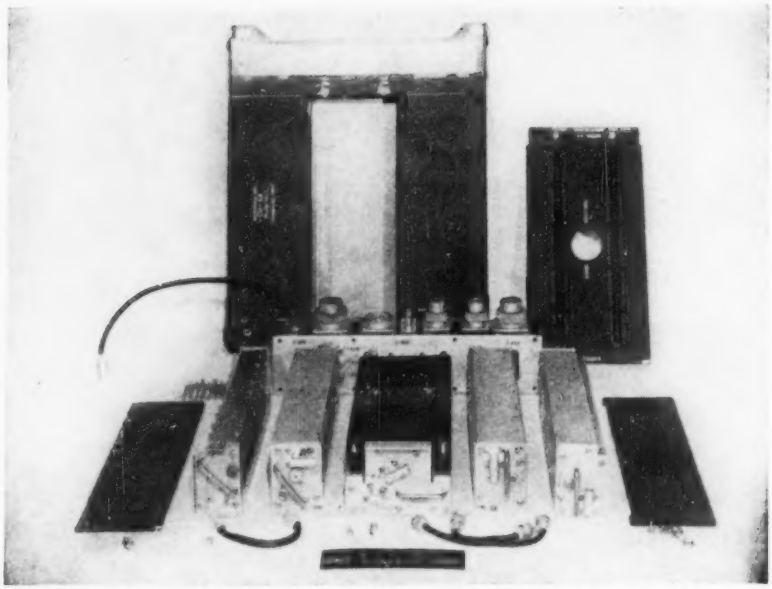
Name_____

Company_____

Address_____

City_____ Zone___ State_____

*T. M. Reg. U. S. Pat. Off.



OLD CONSTRUCTION of radar beacon built for guided missiles compares with this . . .

that a 200-integrator digital differential analyzer could be built with no more than 20 vacuum tubes.

▶ **Transistor Troubles**—Despite hermetic sealing, transistors do not yet come up to early promises of nearly indefinite life. However, Bell Labs believes it is making progress in determining the cause and cures for remaining diseases. Symptom of one such disease is the appearance of a voltage on a floating emitter.

Recent Bell investigations suggest that the problem is "ionic" in nature, caused by moisture which forms surface oxides during high temperature use, Dr. W. J. Pietenpol reported. This moisture may be released in minute quantities from the inner surface of the transistor's metal enclosure, Pietenpol speculated. One solution which Bell has tried with good success is to coat the transistor surface with red (lead) oxide.

Despite the lack of cures for all transistor diseases, Pietenpol had some encouraging figures to report on the reliability of transistors used in the Bell system.

- **0.03% failures**/1,000 hours for 5,876 point-contact transistors used in a card translator.
- **0.16% failures**/1,000 hours for point-contact transistors used in highspeed digital computer.
- **0.38% failures**/1,000 hours for grown-junction transistors used in a rural telephone carrier amplifier.

▶ **Transistor Stabilization**—As the temperature of germanium transistors rises, the collector current increases rapidly to the point where the device burns itself out. The high ambient temperatures encountered in aircraft have therefore limited the use of germanium transistors. However, R. B. Hurley of Convair, and S. Sherr of General Precision Laboratory, described feedback circuit techniques which enable germanium transistors to operate over wider temperature ranges without serious deterioration.

- Hurley described techniques for application to germanium junction transistors, connected with emitter grounded, in which gain increased only 33% from 75F to 175F, and input impedance increased from 3,050 ohms to 3,500 ohms over the same temperature range. When the same technique was applied to silicon transistors, gain jumped only 3.3% between 75F and

NEW CYLINDER that reduces size 50% and cuts weight by approximately 25%.

AIRCRAFT ENGINEERS—

Your Ability

PLUS

Live-ability....

. . . Makes a career with the Georgia Division of Lockheed

Worth Looking Into-

because with the long range program of designing the aircraft of the future while producing those of today, your future stretches brightly ahead in a land of "milk & honey." Here in the foothills of the Blue Ridge Mountains, there's a wealth of good living in a climate of year-round mildness. The sheer *live*-ability of this section makes a place for YOUR ability—and your family to thrive.

Look to **LOCKHEED** AIRCRAFT CORPORATION *for Leadership*

ENGINEERS NEEDED

DYNAMICS DESIGN
STRESS STRUCTURES
LIAISON SERVICE MANUALS
RESEARCH PRODUCTION DESIGN
MANUFACTURING RESEARCH
DRAWINGS CHECKERS
AERODYNAMICISTS

Clip and Mail

so we can contact you with complete information.

LOCKHEED AIRCRAFT CORPORATION—DEPT. AW-1
761½ Peachtree St., N.E.
Atlanta, Georgia

Name_____

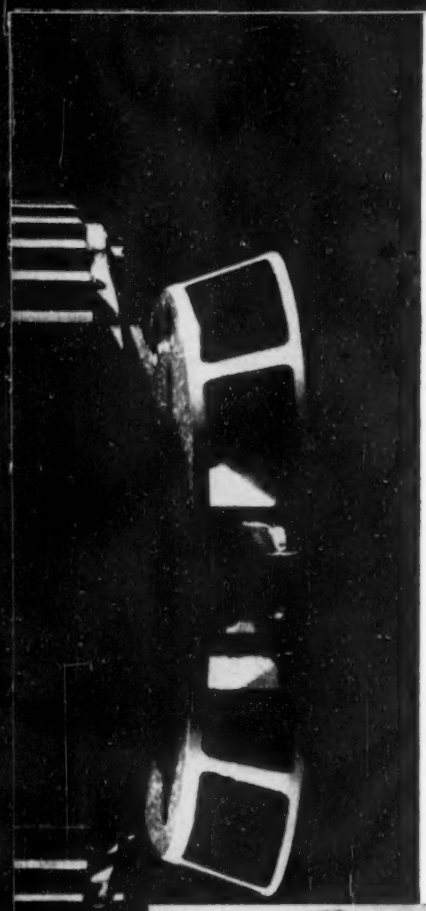
Address_____

City_____ State_____

Job interested in_____

TOMORROW'S AIRCRAFT: *One step closer*

NOW...an a-c motor that runs "cool," retains output at extreme altitudes



Drive power you can depend on . . . that's the keynote of the new line of Westinghouse 400-cycle, a-c motors. They deliver from 1/30 hp to 3 hp continuously from sea level to 50,000 feet—and raise performance standards to new highs in reliability and efficiency.

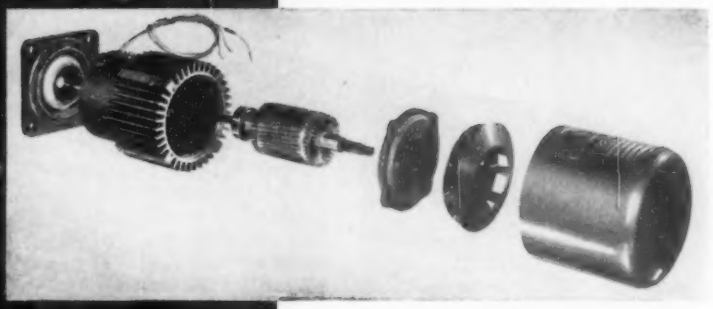
More horsepower than ever before has been packed into extremely small dimensions—like the four-inch diameter frame which delivers 3 hp and weighs under 10½ lbs. In spite of this small size and high rpm, temperature rise is kept exceptionally low by using new cooling techniques giving optimum thermal characteristics to produce the greatest possible horsepower per pound at *all altitudes*.

These new motors, designed to meet the requirements of specification MIL-M-7969, are totally enclosed, fan cooled and explosion-proof —ready-made for the most hazardous airborne applications. Sparks or flame caused by any abnormality cannot progress outside the motor. A patented method of flame suppression provides this same advantage on larger, open motors, over 3 hp.

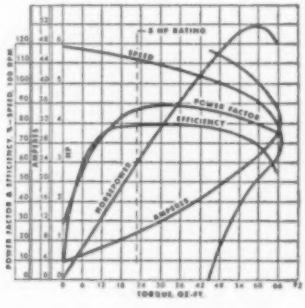
Get More Information . . . NOW!

These new a-c motors—in ratings from 1/30 to 3 hp—are available NOW for direct drive and gear head applications. A drive you can depend on for vital controls and auxiliaries, they meet builder and user specifications with reserve to spare.

And Westinghouse will render full assistance in applying this new motor—the most advanced 400-cycle, a-c drive available today—to help you bring tomorrow's aircraft . . . One Step Closer. Get complete data and application information from your Westinghouse salesman or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-91016



The exclusive Westinghouse cooling design is built around an aluminum frame with integral fins. A new, efficient shrouded fan provides high volume cooling air flow. The rotor has extended conductor bars giving far more effective internal air circulation and cooling without added fan weight.



Performance curves for the 3-hp motor highlight the efficiency of these new a-c motors and their ability to handle loads from sea level to 50,000 feet. Greatly simplified and ruggedly designed, they handle even higher intermittent loads for temporary demands, especially at altitude.

Jet Propulsion • Airborne Electronics • Aircraft Electrical Systems and Motors • Wind Tunnels to Plastics

YOU CAN BE **SURE**...IF IT'S

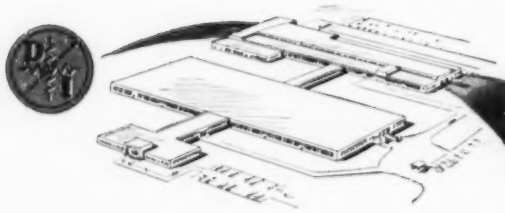
Westinghouse

PRECISION PARTS TO
PRODUCTS WEIGHING TONS—

... A Range of Unusual Versatility

FROM DRAWING BOARD
TO FINISHED PRODUCT—

... All Under One Roof



Servo Amplifiers
Electronic Chassis
Gear Assemblies
Instrumentation
Sheet Metal Cabinets

In Daystrom's 350,000 sq. ft. plant the very finest modern machinery and equipment has been acquired for the manufacture, assembly and test of these products. Daystrom's research, development, engineering and manufacturing specialists have a collective experience that embraces electronics, nuclear instrumentation, computing and electro-mechanical devices. To supplement these creative skills Daystrom also has specialists in metallurgy and welding, as well as organic and plated finishes. Daystrom Instrument has earned its place in the expanding Daystrom Incorporated family.

Gyros
Radar
Computers
Radio
Servo Controls

Gun Fire Control Systems
Ordnance Telescope Mounts
Nuclear Instrumentation
Precision Potentiometers
Electrical Test Equipment

DAYSTROM
INSTRUMENT

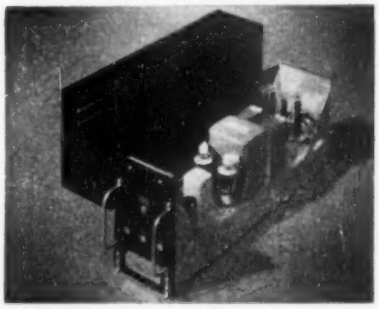
ARCHIBALD PENNA

Division of Daystrom, Incorporated

WRITE TODAY FOR OUR FACILITIES REPORT

300F, Hurley reported. The gain variation of germanium transistors can be cut to only a "few percent" by cascading several stages, but this adds complexity and cuts bandwidth, Hurley said. The technique does not work well with grounded base for lack of gain, he added.

• Sherr described two d.c. feedback circuits which enable germanium transistors rated for 40C operation to be operated at 80C with less than a 10% gain change. He predicted a "significant extension of the operating temperature range of transistors" when such feedback techniques are employed.



REMLER'S speaker amplifier for aircraft.

Boeing 707 to Test Public Address System

Los Angeles—A new hi-fi public address system, designed to improve the intelligibility of inflight announcements and permit playing of recorded music or radio broadcasts, is slated for tests on Boeing's new 707 jet transport.

Airline and aircraft manufacturers representatives were given a demonstration of the system at the recent Western Electronics Show & Convention here. Maker is Remler Co., Ltd., of San Francisco.

In a demonstration to AVIATION WEEK, announcements came over with unusual clarity and intelligibility despite high-level simulated engine noise played over a tape recorder, although the acoustics of a hotel suite are admittedly different from those in an airliner cabin.

▶ **Features**—The new hi-fi system will operate with Remler's recently announced transistorized transluctance mike (AVIATION WEEK Jan. 25, p. 65) or with a dynamic or carbon mike. The amplifier, heart of the system, can be substituted for existing amplifiers, Remler says. Other highlights include:

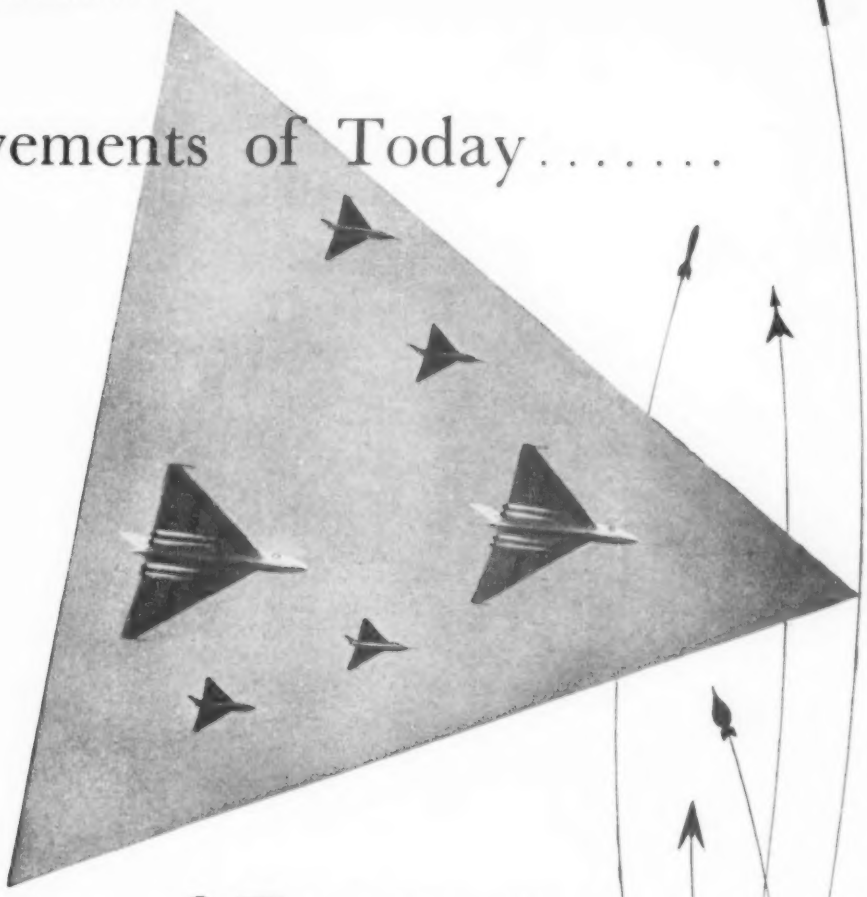
• **Low Distortion.** At full output, maximum total harmonic distortion is 10% over the frequency range of 200 to 8,000 cps., Remler says.

• **Variable Frequency Response.** Amplifier's normal response (flat within 2 db. from 200 to 8,000 cps.) can be preset for varying degrees of low-frequency

"BOMBS AWAY"—The story of an R.A.F. bomber

NO. 8 IN A SERIES ON THE AVRO VULCAN

Achievements of Today.....



Dreams of Tomorrow

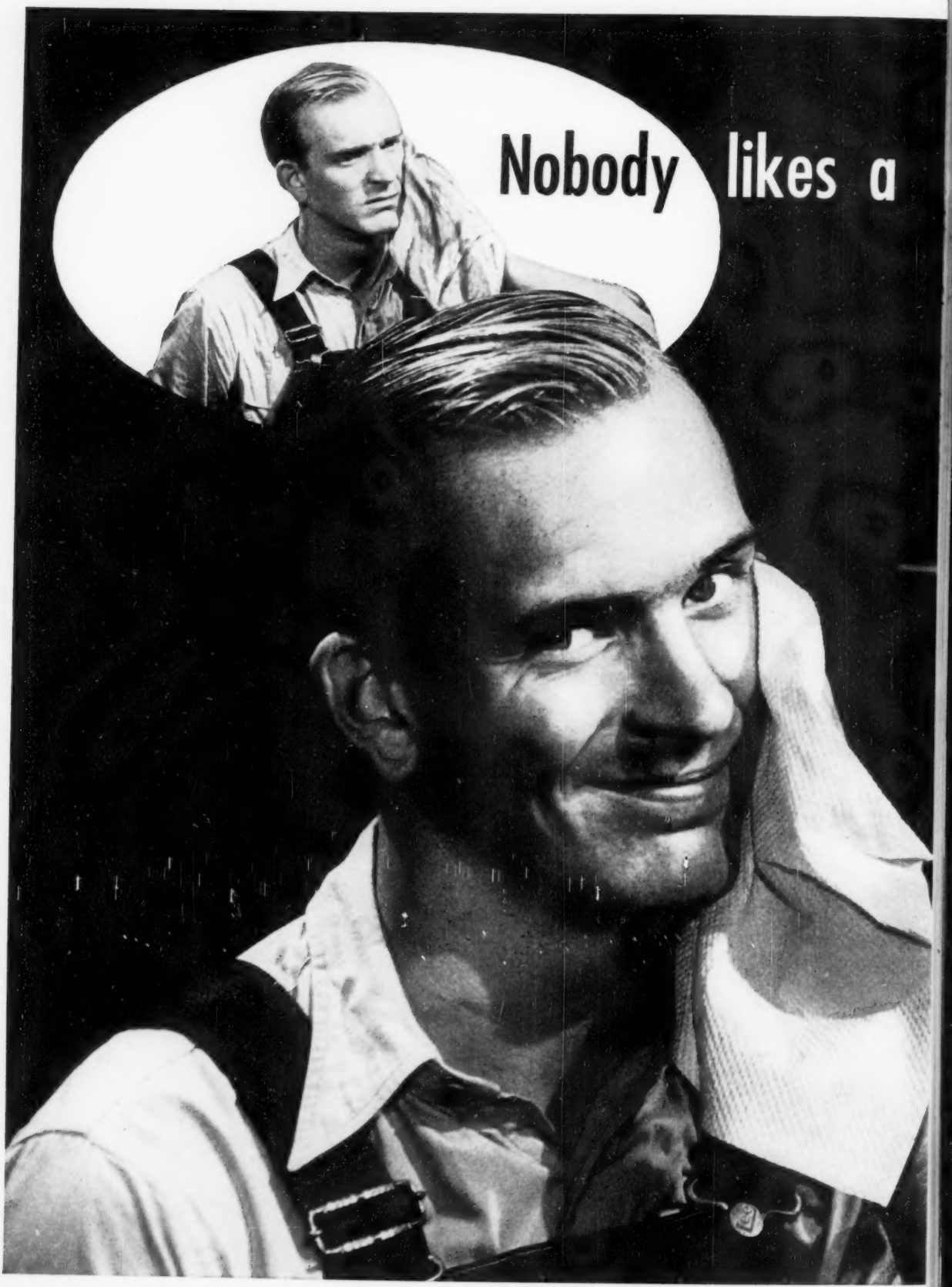
The first chapters of the Delta story have now been written. And what splendid reading they make! When the Avro VULCAN, world's first 4-jet delta bomber, made its debut in August 1952, it provided one of those rare milestones in aviation which mark a truly significant departure from conventional design. This bomber was a clear First. It was followed by other operational types in the U.K. and the U.S.A. and experimental designs in Sweden and France. As the story unfolds, this new shape so brilliantly pioneered by Avro, promises to be an arrowhead of aeronautical progress for years to come. With its remarkable performance and exceptional safety, the Delta, in developed form, will be used to provide sustained flight beyond the sound barrier. It may also prove best in those vast empty regions beyond the stratosphere where speed will be measured in thousands of miles per hour.
But in the aircraft industry, dreams like this are realised only after years of intensive research and development. Avro know this and are providing their designers, technicians and production engineers with the most advanced equipment that modern science can offer.
No wonder that in the half century of their history, Avro have played no small part in man's conquest of the air — the AVRO 504, the Anson, the Lancaster, all immortals, and now the Vulcan! Tomorrow . . . . ?

A. V. Roe & COMPANY LIMITED

Manchester, England

AVRO

Member of the Hawker Siddeley Group
Pioneer . . . and World Leader in Aviation


Nobody likes a

dirty wiper

...Another good reason for switching to **Scott Wipers!**

Because a fresh one is always available—Scott Wipers provide a constant source of clean wiping material.

Scott Wipers are sanitary and disposable. They end the laundering problem . . . simplify distribution and control. They greatly reduce costly scratches and digs in finished work caused by chips lodged in wiping materials.

In aviation plants, the Wiper has caught on fast. From machine shop to final assembly—in almost every department, Scott Wipers are providing ready answers to the industry's highly specialized wiping problems.

They're two-ply and tough yet soft and absorbent. Compare Scott Wipers with whatever wiping material you're using now—for cost, convenience, performance.

The Scott representative or distributor in your area will be glad to help you set up a production line demonstration in your plant. Call him or mail this coupon today.

Scott Paper Company, Dept. AW-1, Chester, Pa.
Please send me full information on Scott Industrial Wipers.

Name_____

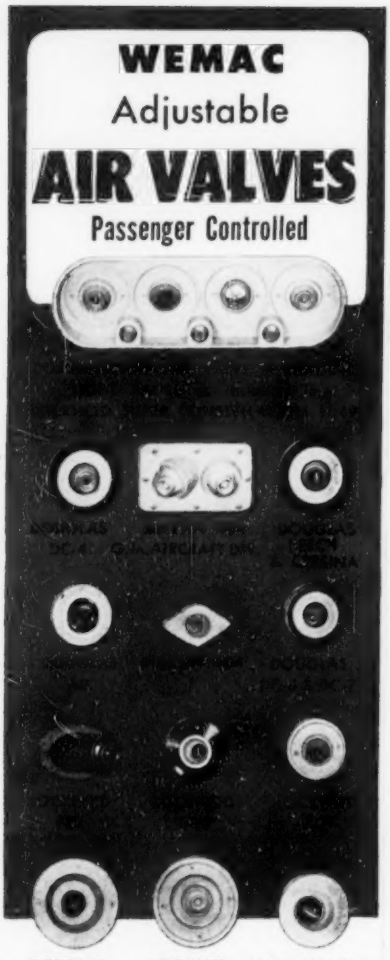
Position_____

Company_____

Address_____

City_____ State_____

WEMAC
Adjustable
AIR VALVES
Passenger Controlled



DOUGLAS C-124 | LOCKHEED 1049 | LOCKHEED 749 & AERO COMDR.

Wemac Air Valves provide a wide range of angular adjustments to control airstream direction and rate of flow by rotation of nozzle. Air leakage and weight are held to a minimum (tested 100% to aircraft specifications). Made of metal and/or plastic. Plastic can be colored to match or contrast with cabin decor.

We Also Manufacture:

- EDGE-LIGHTING PANEL LIGHTS
- ADJ. CABIN LIGHTS, READING AND COCKPIT FLOODLIGHTS
- ELECTRICALLY HEATED EQUIPMENT

For Complete Details Please Write

DESIGNERS WEMAC COMPANY MANUFACTURERS

Wemac Company

Designers & Manufacturers

502 SOUTH ISIS AVENUE
INGLEWOOD, CALIFORNIA

attenuation for voice use to provide optimum intelligibility. Attenuator does not come into play when amplifier is used for music reproduction.

• **Remote Gain Control.** Normal volume level of the system can be increased for important voice announcements by means of a remote control located in the cockpit and stewardess station.

• **Parallel Speaker Operation.** Speakers are operated in parallel from a 70.7-volt amplifier output line. Each has a variable-tap voice coil transformer to permit balancing of individual speaker volume level.

• **Comparable Size & Weight.** Remler says that its new amplifier is no larger, and only slightly heavier, than existing 10-watt p.a. system amplifiers.

Company's address is: 2101 Bryant St., San Francisco 10, Calif.

Missile Relay Takes Shock, Vibration

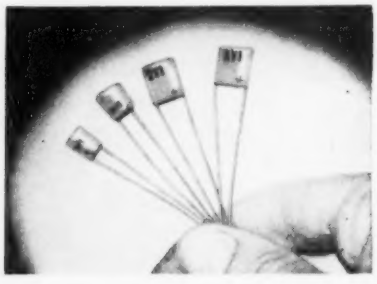
A new relay for missile use is reportedly capable of withstanding 50G shock and 10G vibrations at 500 cps., considerably beyond the 55-cps. limit called for in MIL specs.

The 28-v.d.c. relay is a four-PDT unit, with contacts rated at 3 amp.

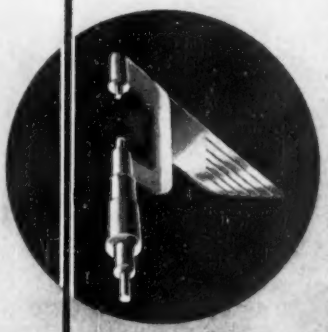
resistive load at 28 v.d.c. or 115 v.a.c., 400 cycles. Unit comes in two models: AN3303-1, with AN-connector base, weighing 0.5 lb., and AN3304-1 with solder terminals, weighing 0.225 lb. Both are hermetically sealed. Ambient temperature range is -55C to 71C. Manufacturer is U. S. Relay Co., 1744 Albion St., Los Angeles 31, Calif.

Other new components announced:

• **Sub-min selenium** diodes, available in four new types (4V1, 5V1, 2Y1, and 3Y1) rated for maximum a.c. input (rms.) of 52 to 130 v., and for maximum d.c. output of 60 to 80 v.,



Hecker

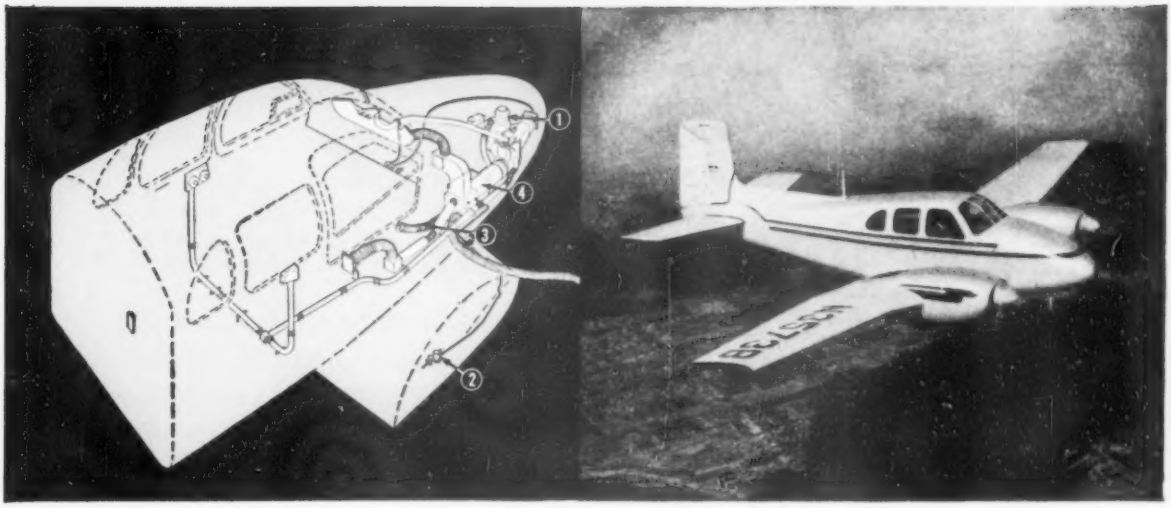


AIRCRAFT TOOLING

Hecker has been designing and building tools for the aircraft industry since 1931, specializing in jigs, fixtures, transport dollies and master tooling. We offer a complete service from tool design through tool building to finished production parts all in one plant. We invite your inquiries and will be pleased to send further information.

Designers and Builders
Tools • Jigs • Fixtures • Special Machinery
Manufacturers of Machined Metal Parts

SINCE 1931
A. W. Hecker CO.
7200 EUCLID AVENUE
CLEVELAND 3, OHIO

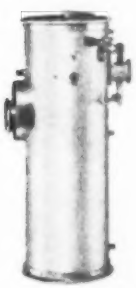


Beechcraft

MODEL B50 TWIN-BONANZA

NEW TEAM FOR ALL-WEATHER BUSINESS FLYING . . .
with home office comfort, too, for Beech Aircraft Corporation's new all-metal "Twin-Bonanza" is a modern, six-place flying office that cruises at near 200 mph, and better than 1,000 miles between fuel stops!

And its S-50 Janitrol "whirling flame" combustion heater assures plenty of cold weather heat for passenger comfort, and all utility needs including the new Beech-designed cold weather engine pre-heating system – one of the first in commercial production aircraft. A separate blower (1), independent electric fuel pump (2), and ducts (3) to the engine nacelles let the S-50 heater (4) do engine pre-heating without need for an outside heat or power source. Janitrol dependability means you'll have heat whenever you want it. And Janitrol acceptance means you can quickly solve your business aircraft heating needs by contacting your local modification center, or you can write direct to us.



The S-50 Janitrol heater, standard equipment on the B50 Beechcraft, is one of eight standard models for all aircraft heating requirements.

37 years experience in combustion engineering

Janitrol

AIRCRAFT-AUTOMOTIVE DIVISION
SURFACE COMBUSTION CORPORATION
Columbus 16, Ohio

District Engineering Offices: New York, 225 Broadway; Washington, D. C., 4650 East-West Highway; Philadelphia, Penna, 401 No. Broad St.; Kansas City, Mo., 2201 Grand Ave.; Fort Worth, 2509 Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave.

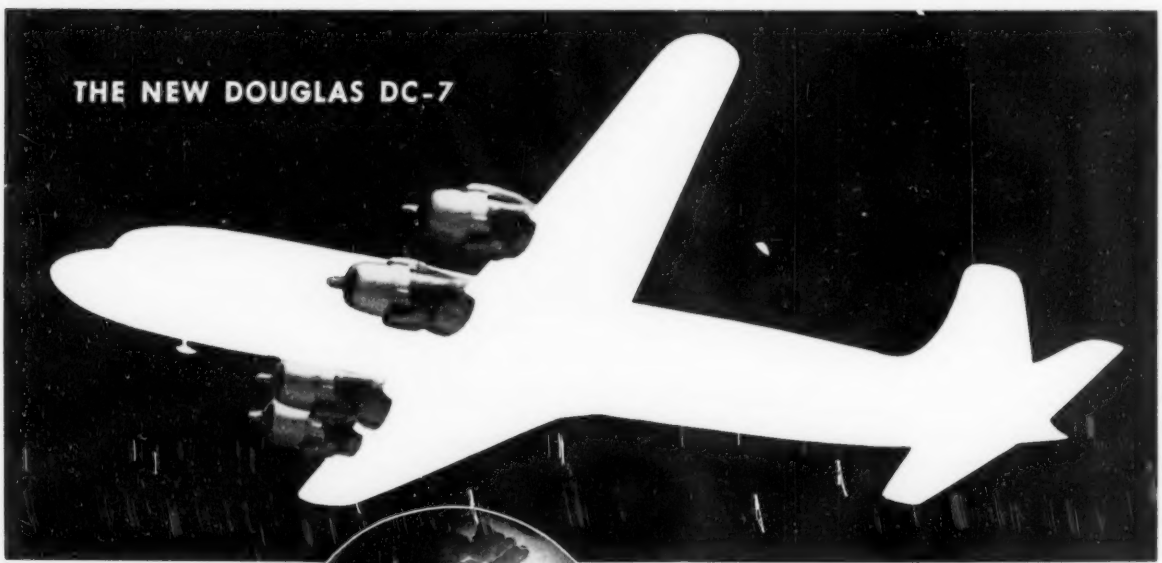
THE PROOF IS IN THE PACKAGES!

Rohr has won fame for becoming the world's largest producer of ready-to-install power packages for airplanes – like the Lockheed Constellation, Douglas DC-7, the all-jet Boeing B-52 and other great military and commercial planes.

This, we believe, is proof of Rohr's engineering skill and production know-how. But it's not the whole story.

Currently, Rohr Aircraftsmen are producing over 25,000 different parts for aircraft of all kinds... many of these calling for highly specialized skill and specially engineered equipment.

Whenever you want aircraft parts better, faster, cheaper – call on Rohr. The proof of engineering skill and production know-how is in the thousands upon thousands of power packages that have made Rohr famous.



WORLD'S LARGEST PRODUCER

OF READY-TO-INSTALL POWER PACKAGES FOR AIRPLANES
-RECIPROCATING, TURBO-PROP, TURBO-COMPOUND AND JET.

ROHR
AIRCRAFT CORPORATION

CHULA VISTA AND RIVERSIDE CALIFORNIA

MAINTAIN ACCURACY

high temperature ACCELEROMETER

Now, Pacific Scientific presents a unique new *high temperature* accelerometer, designed by Humphrey to give accurate, clear signals at temperatures from −65° to +550° F. −far in excess of former operating ranges! The rugged stainless steel and ceramic construction provides long life and allows precision tolerances for maintaining repeatability.

For the higher temperatures encountered in missile work, as well as for use in all types of aircraft where heat dissipation is a problem, this new unit provides the ideal answer!

SPECIFICATION DATA:

- **Environmental**–Temperature: −65° to +550° F. Shock: 60 G's in any direction without damage to the instrument.
- **Accuracy**–Within ½% to 2% depending upon G range and potentiometer resistance. (Including linearity, resolution and environmental conditions.)
- **Range**–Any range from −1 G +1 G and −50 G +50 G. Also available in asymmetrical ranges.
- **Resolution**–0.4% to 0.2% of full range. Potentiometer resistance can be furnished with any DC value between 300 and 20,000 ohms for all ranges.

PACIFIC SCIENTIFIC–pioneering the field of aircraft instrumentation since 1919

Write for full details and specifications–*today!*

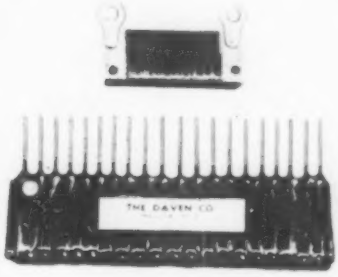
Pacific SCIENTIFIC CO.

LOS ANGELES, CALIF., 1430 Grande Vista Ave.
SAN FRANCISCO, CALIF., 25 Stillman Street
SEATTLE, WASHINGTON, 421 Michigan Avenue
ARLINGTON, TEXAS, 111 East Main Street

with output currents of 5 to 11 ma. Diodes are encapsulated in thermosetting plastic and designed for operation at -50C to 100C. Manufacturer is International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif.

• **Deposited-carbon resistor,** Type HC, hermetically sealed with a non-hydroscopic ceramic and ruggedized for mounting in snap-in clips, is available in resistances up to 200 megohms, ½, 1, and 2 watt ratings, with standard tolerances of 1%. Manufacturer is Dale Products, Inc., Columbus, Nebr.

• **Compact wire-wound resistor,** precision type, rated 0.6 watt, wound on flat cards ¼ in. thick and ⅝ in. wide, in resistances up to 5,000 ohms per section, with up to 40 sections available in a single unit. Accuracies to 0.1% are available, manufacturer says. Where



frequency response is important, card can be Ayrton-Perry wound to hold inductance down. Miniature designs can be mouted on ceramic "Tinkertoy" wafers. For more information, write to Daven Co., Dept. RA, 191 Central Ave., Newark 4, N. J.

FILTER CENTER

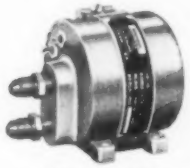
► **Airlines Test Transistor Mike**–More than a dozen U. S. and foreign airlines are currently testing the Remler transistorized hi-fi microphone, first reported in AVIATION WEEK earlier this year.

► **NAL to Test Bendix Radar**–National Airlines is installing a Bendix RDR-1 (X-band) storm warning radar in a DC-6 for evaluation tests. Pan American recently made the first commercial installation. Bendix reports that first production radars will start to roll off the line in October.

► **High-Frequency Silicon Transistors**–Texas Instruments reports that it has produced high-temperature silicon transistors with alpha cut-off frequencies of 20 mc. Company spokesman says that by end of 1955 it expects to be making silicon transistors rated at 10 watts, with alpha cut-off frequencies of 100 ms. –PK

Giannini
LOW PRESSURE TRANSMITTERS

Giannini low pressure transmitters utilize a precision potentiometer element to translate pressure signals into proportional electrical signals (20-50 volts), requiring little or no amplification.



MODEL 45176

Models are available with single or multiple outputs, and can be linear with airspeed, altitude, pressure, or to natural or empirical functions.

Ranges from ±0.5 psi., diff. to 0-150 psi., (abs., diff., gage), under normal environmental conditions, or extreme conditions of high acceleration, severe shock or vibration. Write for complete engineering information.

MODEL 45177

G. M. GIANNINI & CO., INC.
AIRBORNE INSTRUMENT DIVISION
PASADENA 1, CALIFORNIA

Giannini

VITAL, INVISIBLE PART OF EVERY CORNELIUS PRODUCT

TIME

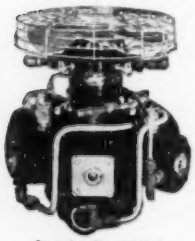
"Lost, yesterday, somewhere between sunrise and sunset, two golden hours, each set with sixty diamond minutes. No reward is offered for they are gone forever."

. . . HORACE MANN

Time was never *lost* at Cornelius . . . it was *spent* . . . on experience. While yesterdays are gone forever, they *do* have their reward for you when Cornelius products are part of your pneumatic systems.

The knowledge purchased with more than 10 years of aircraft pneumatic system experience is ready to reward you *today* with Cornelius products that are proven dependable. *A dependability which only the test of time provides.*

Why don't *you* spend the time *now* to find out more about Cornelius products and the advantages they can impart to *your* products? It will be time *well* spent.

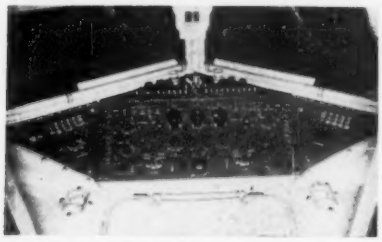


Cornelius Compressor
4 CFM—3000 PSI

THE Cornelius COMPANY
MINNEAPOLIS 21, MINNESOTA

PIONEERS IN THE DEVELOPMENT OF PNEUMATIC SYSTEMS FOR AIRCRAFT

NEW AVIATION PRODUCTS



AVIONIC CONTROLS grouped on panel.

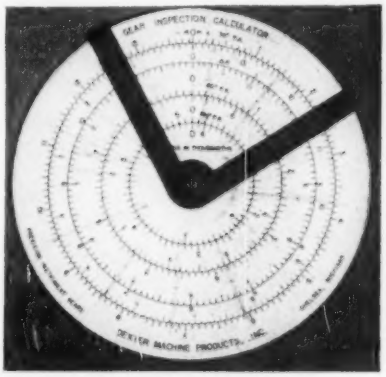
Master Radio Panel Centralizes Controls

A master radio control panel centralizes forward and above the pilot and co-pilot all controls necessary for operation of avionic equipment on DC-3 and Lodestar executive aircraft.

Parts are mounted and wired on aluminum sub-panel, with switches and controls brought through a plastic front panel. Face of plastic is engraved to show function of each control, and panel lights illuminate the engravings. Brightness is controlled by a variable rheostat.

The panel includes provisions for various communications and navigation units, including instrument flying and landing systems.

Aerodex, Inc., International Airport, Miami, Fla.



HANDY CALCULATOR checks gears.

Plastic Calculator Gives Gear Inspection Data

New gear inspection calculator determines the relationship between tooth thickness and radial displacement and total composite error for pressure angles of 30, 20 and 14½ deg. when the gear is inspected on a gear-rolling fixture. It is said to solve problems like these:

- Change in center distance for a given reduction in tooth thickness.
- Integrated tooth thickness change for

with THOMPSON EXTRA-LANDINGS RETREADS

The unnecessary expense of frequent wheel changes can be eliminated by using Thompson Extra-Landings Retreads. Built better to last longer, Thompson retreads provide more landings per tread and more treads per casing. They are a superior product—expertly designed and skillfully manufactured.

Save money with Thompson retreads . . . used more than any other make by airlines throughout the world.

Write, phone or wire nearest Thompson plant for prompt and efficient service.

THOMPSON AIRCRAFT TIRE CORPORATION

WESTERN PLANT: 18th and Minnesota Sts. • San Francisco 7, Calif • MIssion 7-7320

EASTERN PLANT: International Airport • Miami 48, Florida • Phone 88-1681

Why Choose **menasco** **?**

Because... **MENASCO USES UNIWELD FOR BETTER LANDING GEAR**

Uniwelding of landing gear components results in vital savings in weight, material and machining. That is why famous names in the aircraft industry choose MENASCO for better, stronger and lighter landing gear. By using UNIWELD, a form of pressure welding in which large complicated parts can be broken down into smaller, easier to handle components, MENASCO engineers are producing one-hundred percent welds that are structurally identical to the base metal. A current application is in the MENASCO-built landing gear for the rugged Douglas AD-5 "Skyraider," workhorse of the Navy's carrier arm.

Dependability of MENASCO'S UNIWELD process is well demonstrated in this design, where the gear not only must withstand the terrific impact of the arrested landing, but also is utilized as the catapult harness anchor during the carrier take-off.

MENASCO'S exclusive UNIWELD process is another prime example of this company's aggressive program of continuing product research and development.

first in DEVELOPMENT QUALITY SERVICE DELIVERY

menasco manufacturing company

Specialists in Aircraft Landing Gear

805 SOUTH SAN FERNANDO BOULEVARD, BURBANK, CALIFORNIA

a given radial displacement.

• Limits of indicator reading when a given gear is zeroed at standard pitch radius.

Made of plastic components and measuring 5 in. in diameter, the calculator retails for $3.00 postpaid.

Dexter Machine Products, Inc., 20451 U.S. 12 West, Chelsea, Mich.

Leakage Eliminated in Rotary Plate Valves

Optically true hardened steel plates in a new series of hydraulic non-interflow rotary plate valves are said to eliminate virtually all leakage between ports.

The new valves are housed in lightweight aluminum alloy bodies. The manufacturer claims that by using simple design and minimum number of parts, handle loads are kept unusually light. The valves are available for 1,500- and 3,000-psi. service. They meet specification MIL-V-5529A.

Pacific Div., Bendix Aviation Corp., 11600 Sherman Way, North Hollywood, Calif.

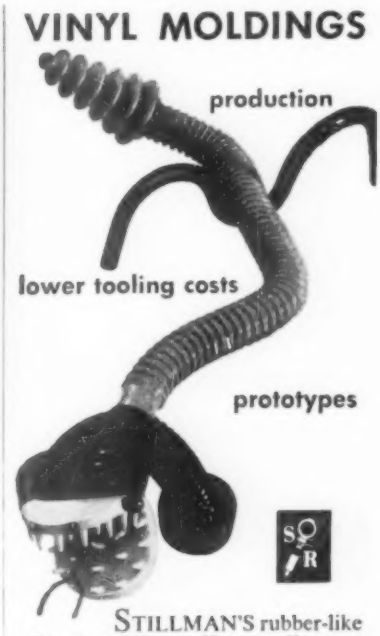
ALSO ON THE MARKET

Porous stainless steel sheet of extremely high airflow permeability and high tensile strength is recommended for boundary layer control applications on high-wing-loading aircraft. The sheet is said to have unusually smooth aerodynamic surface and finely controlled permeability. It permits an airflow of 8 cubic feet per second per square foot at a differential pressure of 0.21 psi. Density is approximately 60% that of solid stainless steel.—Aircraft Porous Media, Inc., Glen Cove, N. Y.

Percoloy bonding metals, designed for all aluminum alloys, include Solbond for low-temperature bonding (applied with soldering iron, requires no flux, does not upset alloy's heat-treat); Brabond, which is stronger and bonds at temperatures from 500 to 800F; and Welbond, a high-strength, high-temperature material, that is capable of bonding at the solution heat-treat temperature of the parent metal, making possible simultaneous heat-treat and bonding.—Precision Electronic Research Co., Glendora, Calif.

Resistoflex plastic hose, designed for use with new jet fuels and synthetic lubricants, now comes with integral, forged one-piece aluminum elbow fittings. New fitting is said to reduce resistance to flow, give more strength for less weight.—Resistoflex Corp., Belleville, N. J.

SINE-COSINE
MECHANISM
INSTANTANEOUS—
ACCURATE PRECISION
ANGLE RESOLVER FOR
ANALOG COMPUTERS
Librascope's Sine-Cosine mechanism is a precision analog computer element for converting angular rotational movements into linear sine or cosine movements. Designed for problems of changing variables involving vector components, range and bearing computations, flight computations and many other trigonometric functions. Write for detailed catalog information
SPECIFICATIONS:
Positive pre-set indexing (3 position 90° apart)
Mounting: Conventional, 3 lug
Tolerances: zeros through 2 holes within .001 in.
Stroke .750 ± .0015" each side zero
Accuracy: 0.2% full scale
Weight: 2 oz.
Computers and Controls
LIBRASCOPE
1607 FLOWER ST., GLENDALE, CALIF.


VINYL MOLDINGS
production
lower tooling costs
prototypes
STILLMAN'S rubber-like Vinyl moldings offer excellent resistance to corrosion, oxidation and abrasion. Investigate now—Vinyl may be the economical answer to your problem.
Stillman Rubber Co.
5811 Marilyn Ave., Culver City, Calif.

control engineers

A further expansion of Honeywell's Aeronautical Division has created the following unusual opportunities. If you are interested in a permanent position with America's largest control manufacturer, consider these challenging opportunities now available at top salaries.

MECHANICAL DESIGN ENGINEER —GYROS

New positions open in the design of mechanical components of gyros, accelerometers, synchros and other related devices. Requires minimum of 5 years experience in mechanical design.

HYDRAULICS DESIGN ENGINEER

New opportunity in design of hydraulic components and systems involving servos, valves, actuators for automatic flight controls. Requires engineering degree or equivalent and 5 years' design experience.

RESEARCH ENGINEER —GYROS

Unusual new position open in Research Department for engineer to work on extremely low friction, low error and high precision multi axis gyro platforms. Position requires a Mechanical Engineer or Physicist with experience or advanced training in machine design, gyro principles and analytical mathematics.

METHODS ENGINEER —GYROS

New position open as methods engineer working primarily on the assembly of precision gyros and other small devices. College degree or equivalent desirable plus 5 years' experience in similar or related work.

AERODYNAMICIST AND HELICOPTER DYNAMICIST

Two new challenging positions open for an aerodynamicist and a helicopter dynamacist in the research phase of autopilot development. Will involve work on control dynamics of the airplane or helicopter, analytical investigations of control problems and correlation of experimental results with analytical predictions. Advanced degree in engineering, physics or mathematics or equivalent experience desired.

SERVOMECHANISM RESEARCH ENGINEER

Newly created position open in our Analytical Section studying control operations as simulated on our "Reac" computer. Work will be primarily in field of jet engine controls and will require an understanding of jet engine operation and control problems. Analog computer experience is necessary.

If you are interested in any of these well paid positions located in Honeywell's new Aeronautical Plant in Minneapolis, send your resumes to—

MINNEAPOLIS **Honeywell**

First in Controls

J. Arthur Johnson
Director of Engineering Placement
Dept. AW-9
Minneapolis-Honeywell Regulator Co.
Minneapolis 8, Minnesota

ENGINEERS

Attractive Positions with

TEMCO

IN DALLAS, TEXAS

For Details See
OCT. 11 AVIATION WEEK
or Write
E. J. HORTON
Engineering Personnel
BOX 6191
DALLAS, TEXAS

TOOL PROJECT ENGINEER

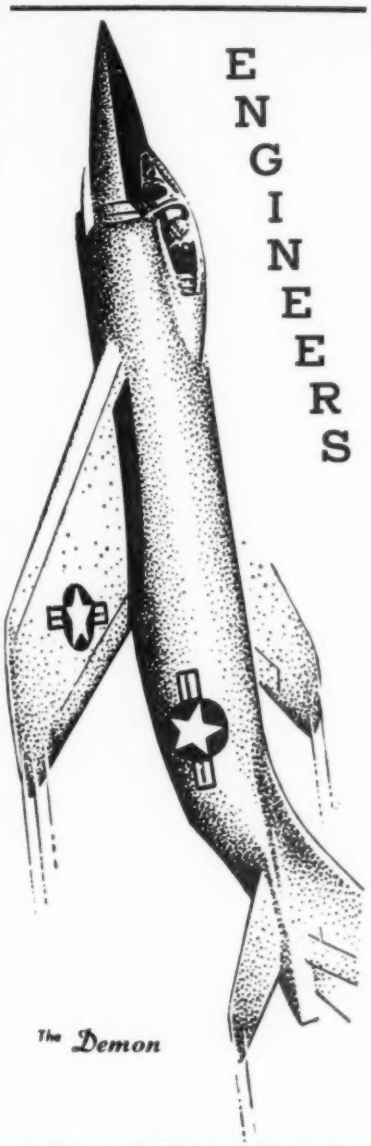
REQUIRED EDUCATION AND EXPERIENCE: Engineering degree is necessary and applicant should have a minimum of eight years of applicable experience of which at least five years were in a responsible position as a supervisor.

This position is open to a qualified man who is looking for a future with an aircraft manufacturer.

All applicants must be willing to relocate in the midwest's most progressive industrial area. Moving allowances provided.

Send your complete resume to:

P-3780, Aviation Week
520 No. Michigan Ave., Chicago 11, Ill.



M. A. C. — The McDonnell Aircraft Corporation offers many career advantages to experienced:

Designers	**Stress Analysts**
Aerodynamicists	**Dynamicists**
Wind Tunnel Test Engineers	**Flight Test Engineers**
Physical Test Engineers	**Electronics Systems Engineer**
Thermodynamicists	**Technical Illustrators—Writers**

Qualified applicants will receive assistance in relocating.

Write to:
Technical Placement Supervisor
Box 516, St. Louis 3, Missouri

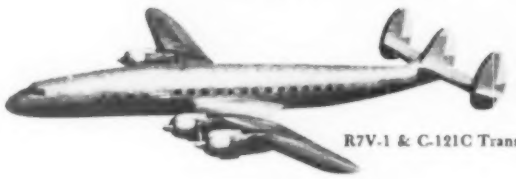
You'll Like Working For M.A.C. !

McDONNELL Aircraft Corporation
Manufacturers of Airplanes and Helicopters • Flight Test

Lockheed's Super Constellation Family...

WV-1 & RC-121C Radar Search Plane

Super Constellation



R7V-1 & C-121C Transport

how it builds better futures for engineers

Five Super Constellation types are flying today—as luxury airliners, cargo transports and radar search planes. The careers of engineers associated with the Super Constellation's development have grown steadily since the project started fifteen years ago.

Production orders extend into 1956. And in development: turbo-prop Super Constellations and jet transports to continue Lockheed leadership in rapidly expanding passenger and cargo transport fields.

To the career-conscious engineer this means:

More security—for the Super Constellation's wide use in commercial fields gives Lockheed a stable development and production base which is unaffected by international events.

More opportunity for promotion and achievement—for the growing number of Super Constellation projects (along with Lockheed's diversified efforts in nuclear energy, supersonic fighters, trainers and bombers) gives engineers more scope for their ability, more opportunity for creative engineering.

Lockheed offers engineers: increased pay rates now in effect; generous travel and moving allowances; an opportunity to enjoy Southern California life; and an extremely wide range of employee benefits which add approximately 14% to your salary in the form of insurance, retirement pension, sick leave with pay, etc.

Training Program for Engineers

Aircraft experience is not necessary to join Lockheed. An engineering degree or equivalent experience qualifies you to receive transitional or on-the-job training—at full pay.

Immediate openings for:

Aerodynamics Engineers

Airborne Antenna Designers
with an Electrical Engineering degree, an Electronic option and approximately two years' practical airborne antenna design experience.

Design Engineers A & B
in electrical, hydraulic, mechanical and structural fields.

Flight Test Analysis Engineers
to evaluate airplane and engine performance from flight test data. The position requires a degree in Mechanical or Aeronautical Engineering.

Flight Test Instrumentation Engineers
for the development and application of special instrumentation in analyzing autopilots, acoustics and vibration. The position requires a degree in Electrical Engineering or Physics.

Mathematical Analysts
to work on Lockheed's two digital 701 computers. Requirements: B.S. or M.S. in Mathematics or Physics.

Structures and Stress Engineers
to perform work in structural analysis, basic loads and stress methods.

Structures Research Engineers
for Lockheed's Research Laboratory.

Thermodynamics Engineers

Weight Engineers

Mr. E. W. Des Lauriers, DEPT. AW-9
Lockheed Aircraft Corporation
1708 Empire Avenue, Burbank, California

Dear Sir:

Please send me your Lockheed brochure describing life and work at Lockheed in Southern California.

My name

I am applying for . . . (name position in this advertisement which fits your training and experience)

My street address

My city and state

Lockheed

Aircraft Corporation • Burbank

California

SUPERINTENDENT Of Machine Shop

- This is a high level position with complete charge of of production machine shop with an old established aircraft manufacturer.
- Applicant must have 8 to 10 years experience, preferably in aircraft engine or airframe manufacturing, 4 to 5 years of which has been in a supervisory capacity.
- Formal engineering education is desirable but not essential.
- Plant located in growing industrial area of the southwest with available modern housing, located near schools and shopping centers.

Send complete resume to

P-3797 Aviation Week
520 No. Michigan Ave., Chicago 11, Ill.

Cessna

ENGINEERING OPPORTUNITIES

with world's leading producer of light commercial airplanes

for

- **Design Engineers**
- **Design Draftsmen**
- **Research Engineers**

Send Resume to
Employment Manager

CESSNA AIRCRAFT CO.
WICHITA, KANSAS

RAYTHEON'S MISSILE AND RADAR DIVISION

Bedford, Mass.

Career Engineering Positions Available

DESIGN ENGINEER

Three to five years' experience required in Ground-to-Air Missile launching equipment and/or field experience with intimate knowledge of missile handling equipment.

HEAT TRANSFER ENGINEER

Four to five years' experience required in cooling techniques and heat transfer design of electronic equipment for use in Guided Missiles and Airborne Radar Systems.

Also a number of positions are available for Senior Electronic Engineers with experience in Circuit Design, Missile Systems, or Radar Systems.

RAYTHEON'S MISSILE AND RADAR DIVISION is a well-established, progressive organization located 20 miles from Boston, an area offering excellent housing, recreational and educational facilities.

Please write, giving full particulars concerning education, experience, and salary, to Personnel Division

RAYTHEON MANUFACTURING COMPANY
190 Willow Street, Waltham, Mass.

General Foreman Electronic Assembly

If you have a background of engineering and 5 to 8 years experience in production of electronic assemblies, with at least 2 years as a supervisor, you may qualify for this position of General Foreman.

This is an established aircraft manufacturer located in the midwest in a concentrated aircraft industrial area. Modern housing conveniently located to plant and recreational facilities. Liberal travel and moving allowances.

Send complete resume and salary requirements in first letter to:

P-3798, Aviation Week
520 No. Michigan Ave., Chicago 11, Ill.

OPENINGS IN HELICOPTER EXPRESS AND PASSENGER PROGRAM

Traffic, Material Control
Supply, Cargo, Accounting, Audit
Ground Operations

LOS ANGELES AIRWAYS, INC.
Box 10155 Airport Station Los Angeles 45, Calif.

ELECTRICAL—ELECTRONICS DESIGN ENGINEERS

Long Range Program—Aircraft Trainers

Challenging, creative assignments in an expanding and progressive organization. BSEE plus experience in electro-mechanical devices, servo-mechanisms or analogue computers desirable. Send complete resume to:

STANLEY AVIATION CORPORATION
Buffalo Municipal Airport, Buffalo 25, N. Y.

PRODUCTION ENGINEER
WANTED

Southern California Manufacturer engaging in the development and production of tubular aircraft calrod-type of heaters requires man to take full charge of production and engineering phases.

When answering, give detailed resume of past experience and age, etc.

Address reply to P. O. Box #45363

INTERNATIONAL AIRPORT
LOS ANGELES, CALIFORNIA

LYCOMING

IS LOOKING FOR ENGINEERS!

● Here is an opportunity to work with internationally famous engineers, in the design and development of aircraft engines (gas turbine, reciprocating or related fields).

If you can qualify in the following, we will arrange a personal interview, with our Engineers, to discuss the many opportunities available at Lycoming.

- PROJECT ENGINEERS
- LAYOUT DESIGNERS & DRAFTSMEN
- DESIGN DRAFTSMEN
- DESIGN ENGINEERS
- ANALYSTS
- CHECKERS

Send complete resume to:

E. E. Blakeslee, *Per. Supv.*

AVCO

Lycoming Division
Avco Mfg. Corp.
Stratford, Conn.

paved invitation

This is the front door to one of the most exciting developments in the aircraft industry today... the development of a top team of Martin scientists, physicists and engineers to carry on a planned, long-range, top secret program.

Never before has there been such an opportunity —and invitation—to a small group of qualified creative engineers.

Write to J. M. Hollyday, Box A-6, The Glenn L. Martin Company.

MARTIN
BALTIMORE · MARYLAND

Bendix

ELECTRONIC—
MECHANICAL—
AERONAUTICAL

ENGINEERS

Plan *NOW* to broaden your engineering experience in the permanent field of engineering technology which Bendix Products offers graduate engineers in the following product lines:

AIRCRAFT LANDING GEAR
JET ENGINE FUEL SYSTEMS

Involving project work, creative product design, testing program for engineers in the following activities:

STRUCTURAL ANALYSIS
SERVO-MECHANISMS
PROCESS ANALYSIS
ENGINEERING LABORATORY
ENGINE TEST ANALYSIS
PRODUCT DESIGN

And many other engineering opportunities.

Send complete resume of education and experience to:

Employment Department

BENDIX PRODUCTS DIVISION OF
BENDIX AVIATION CORPORATION
401 Bendix Drive
SOUTH BEND, INDIANA

SUPER-92

over **200** mph for your **DC-3**

CAA Approved R1830-SUPER-92 engines allow 700 HP normal cruise, better single engine—lower fuel and maintenance mileage costs with 20,000 extra miles between changes, with same overhaul intervals and costs as —92. Fully interchangeable with —92 —same weight, mounts, cowls, lines, etc. Proven by thousands of hours of practical executive operation.

ENGINE WORKS

LAMBERT FIELD INC.
PRATT & WHITNEY
WRIGHT
SALE OVERHAUL

ST. LOUIS, MO.
CONTINENTAL
LYCOMING
EXCHANGE

HILLER HELICOPTER

Model UH 12A with Agricultural Spray equipment, full canopy, dual controls, 2-way radio.

In excellent condition

East Coast Aviation Corporation
Bedford Airport Lexington, Mass.

REPLIES: Box No.: Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)
LOS ANGELES: 1111 Wilshire Blvd. (17)

SELLING OPPORTUNITIES OFFERED

SALES ENGINEER — Adhesives. Nationally known manufacturer seeks experienced salesman for expanded West Coast activities. Must have sales experience to aircraft industry or equivalent. Permanent. Exceptional opportunity. Please give complete details in first letter. SW-3914, Aviation Week.

LEADING MANUFACTURER of precision aircraft accessories and instruments requires the services of a top-flight sales executive. Company has several plants located in the midwest and person selected will be required to headquarter in main midwestern facility. Position entails considerable traveling. Applicant must have background of successful industrial or high level aircraft sales. Contacts with Wright-Patterson, Navy, and Airframe Contractors extremely desirable. Man selected will not upset present personnel in aircraft division. He will be brought in as assistant to the vice president for thorough indoctrination in management methods. SW-3971, Aviation Week.

POSITIONS WANTED

SALES PILOT. Aircraft or Accessory. Aircraft engr—sales and airline experience. Desires Co. sales representative position. PW-3854, Aviation Week.

GRADUATE AIRCRAFT maintenance engineer, commercial pilot, A&E desires responsible aviation position. Eight years in aviation industry, age twenty-eight, single. Resume available upon request. PW-3936, Aviation Week.

EXECUTIVE PILOT position desired airline transport rating five years executive flying engineering background mechanics license DC-3 Convair 240-340 4745 6000 hrs. Mel 1500 Sel complete resume on request. PW-3895, Aviation Week.

AVAILABLE YOUNG capable power plant engineer and pilot proven ability to solve unusual problems quickly 12 yrs. Aero exp. in design, development, test and procurement. Master of Science Aero. Eng. in power plants. Desires staff position with challenging future. Resume on request. PW-4024, Aviation Week.

SELLING OPPORTUNITY WANTED

SEASONED SALES executive offers 25 years excellent background in all phases sales & sales management. Ability to develop sales. Capable of organizing or reorganizing present staff. Looking for position with aircraft parts manufacturer or with Airline where top selling ability is required. Five figures salary plus desired. SA-4001, Aviation Week.

WANTED
AIRPORT OPERATION NEAR LARGE CITY
Give complete details concerning facilities available, etc. Write
BO-3944, Aviation Week
520 N. Michigan Ave., Chicago 11, Ill.

FOR SALE

1—P39, 1—P40N, 5—F51, 5—T6, 1—DC3, 1—C47, 1—B25, 5—BT13, 3—T35, 1—P38, & Parts for Above, Plus P&W, Ham Std Parts.

HARDWICK AIRCRAFT
Rosemead, (L.A. County), Calif.

WE ARE SPECIALISTS!!!

IN THE INSTALLATION AND SERVICING OF . . .

COLLINS—BENDIX

LEAR —SPERRY— *ARC*

COMPLETE SYSTEMS IN STOCK FOR IMMEDIATE INSTALLATION

GENESEE 7301
ROCHESTER AIRPORT
ROCHESTER N. Y.

OPENING SOON AT ALLEGHENY COUNTY AIRPORT PITTSBURGH, PA.

SPECIAL SERVICES TO THE AVIATION INDUSTRY

AIRCRAFT DEALERS

EXECUTIVE AIRCRAFT
Complete Services and Sales
DC-3 LODESTAR D18S

Inc. of ST. LOUIS **REMMERT-WERNER** Inc. of TOLEDO

EXECUTIVE TRANSPORT AIRCRAFT
All Models
BEECHCRAFT LOCKHEED
CONVAIR GRUMMAN
DOUGLAS CESSNA
AERO COMMANDER
JIM WELSCH Aircraft Sales
60 East 42nd Street, Suite 628
New York 17, New York Murray Hill 7-5884

PARTS & SUPPLIES

NAVCO INC. Lambert Field St. Louis, Mo. TErryhill 5-1511
Has all Parts and Supplies for Executive
DC-3 LODESTAR BEECH
Airframe: A.R.C. Bendix Collins Lear Sperry Wilcox P&W
Engines: Continental Wright
Radios: Goodrich Goodyear

INSTRUMENT SERVICE

RAS INCORPORATED
LEAR AUTO PILOT GYROS OVERHAULED
APPROVED REPAIR STATION
ONE OF THE MANY RAS SERVICES
READING AVIATION SERVICE, INC.
MUNICIPAL AIRPORT READING, PA.

DIAL REFINISHING
We can refinish your dials or can supply many standard dials from our stock.
Screen Process or Hand Painted.
Fluorescent - Phosphorescent - Radium.
Special Dials made to order. Prompt Delivery.
Reasonable prices.
SOONER DIAL CO.
Box 234 - Clinton, Oklahoma - Phone 486

OVERHAUL & MAINTENANCE

REMMERT — WERNER, Inc.
Lambert Field St. Louis, Mo.
offers your choice of
1 DAY 100 hour INSPECTIONS
or
2 DAY 3 DAY 100 hour OVERHAULS
for
BEECHCRAFT DC-3 LODESTAR

AN & AC FITTINGS! ER FITTINGS! TERMINALS & TURNBUCKLES!

Immediate delivery from the world's largest stock of aircraft parts!

IMPORTANT! Check this ad carefully each time it appears—new offerings, never before advertised, will be listed! This group is just a small sample of our huge stock. Let us screen your inquiries for aircraft parts, accessories, AN and NAS hardware!

AN & AC FITTINGS

Pieces		
115	AN756-12	
75		-D40
151	AN760-D12	
87	AN761-D20	
47	AN762-D12	
519	AN763-12	
25		-D12
540	AN773-2	
32		-4
67		-6
64	AN775-4	
3,195		-4D
570		-5D
2,360		-6
128		-6D
14,588		-8
36		-8D
1,202		-8NS
417		-10
155	AN776-4D	
85		-6D
428		-10D
156	AN777-4D	
167		-5
458		-6D
200		-10D
1,300	AN778-8D	
43	AN780-3	
1,130	AN781-1	
176		-2
610		-3
243	AN784-D5	
298		-D6
36	AN789-3	
1,332		-12
440	AN792-3	
40		-4
184		-5
68		-6
39		-10D
27		-12D
2,691	AN793-14	
2,650	AN794-4	
48		-6
334		-117
240	AN798-6	
102	AN799-8	
23	AN800-5	
38	AN804-12D	
25	AN805-4	
90	AN806-3	
347	AN806-D3	
44		-8
107		-8D
80	AN806-12D	
87		-16D
45	AN807-6	
25	AC810-B6	
2,080		-10
118		-C10
400	AC811-BT2NS	
1,433		-D2-4D
38		-F2-6NS
8,253		-BT3
11,501		-CT-3
2,895		-ET3CS
1,080		-FT3
4,480		-HT3
2,679		-JT3
25,127		-T3CS
830		-BT4NS
40		-DT4
1,684		-ET4D
25		-FT4NS
8,183		-MT4D
4,082		-ST4D
77,956		-T4CS
3,014		-T4D
402		-4-6-DT
6,250		-CT45-45°
5,830		-BT5
5,130		-BT5D
1,789		-BT5NS
8,930		-CT5D
4,817		-ET5
617		-FT5D
930		-FT5NS
1,680		-JT5D
1,736		-KT5D
738		-ST5
20,153		-T5D
257,742		-T5CS
564		-ST5D
9,232		-BT6NS
2,740		-CT45-6

Pieces		
511		-CD-6D
2,690		-HT6NS
10,369		-HT6D
593		-KT6
590		-KT6D
31		-T6NS
623		-JT6-4-6
2,452		-CT8
1,430		-CT45-8
809		-CT8D 90°
57		-GT8
2,017		-CT8-2D
230		-FT8-4D
733		-KT8D
206	AC811-T8CS	
5,916		-T8D
26,800		-T8NS
769		-JT8-4-4D
57		-JT8-6-6D
10		-BT10D
208		-BT10NS
346		-KT10D
205		-ST10D
800		-JT10-6-4D
143		-JT10-8-6D
253		-JT10-8-8D
1,049		-JT10-10-6D
540		-JT10-10-8D
240		-KT10-10-10-4D
71,079		-CT12
1,478		-CT12D
1,515		-T12D
78		-T12SS
137		-J12-5-5D
640		-JT12-8-6D
241		-JT12-12-4D
40		-BT14NS
196		-CT16D
1,260		-T16CS
30		-BT16NS
104		-FBT16D
297		-T20CS
647		-T24CS
802	AN814-2	
3,608		-2D
144		-20
146	AN815-20D	
200	AN816-2-2D	
30		-5-4B
100		-5-4D
87		-6
25		-6-2
359		-8D
457		-20D
185	AN819-20	
280		-24
44	AN821-4	
23		-5D
167		-10D
26		-20
361	AN822-3B	
358		-6-2
112		-6B
195		-6-6
82		-6-8
200		-10D
301		-20D
61	AN823-5D	
24	AN823-6D	
35		-12D
31		-16
195	AN824-4	
63		-12
46		-24D
128	AN825-8D	
95		-12
88		-16-12D
31	AN826-6D	
45	AN827-4	
50		-6D
92		-16D
83	AN828-4D	
5,229		-6D
175		-8D
61		-12D
1,983	AN829-4D	
503		-4-6D
2,258		-6D
304		-6-8D

Pieces		
534		-6-4D
2,158		-8D
306		-10
248	AN830-4	
315		-4D
250		-5D
373	AN831-5D	
2,950		-6D
206		-8D
98	AN832-3	
147		-8
58		-12D
176		-20
34		-32D
57	AN833-8	
66		-12
25		-16D
345	AN834-4	
79	AN835-4D	
212		-8D
207		-16D
218		-20
338	AN836-10	
62	AN837-10D	
63		-12
244		-16D
129	AN838-B24	
45	AN839-16D	
232	AN840-6D	
978		-8D
37		-10D
181		-12D
40		-20D
272	AN841-6D	
149		-8D
102	AN841-10D	
1,381	AN842-4D	
132		-12D
98		-17D
65		-20D
2,229	AN843-4	
290		-4D
53		-6D
5,834		-12
41	AN844-4D	
489		-8D
43		-12D
81		-16D
54		-17D
32		-17D
124		-21D
596	AN845-4	
703		-16D
20	AN846-12D	
41		-20D
104	AN847-12D	
27		-20D
129		-24D
91		-24D
151	AN848-6D	
31		-8D
61		-10D
51		-20D
950	AN850-4D	
1,263		-8
625		-16-16
129		-24
451	AN865-1	
681		-2
140		-6
542	AN867-2	
310	AN873-6	
69	AN876-3Z	
20	AN893-1D	
112		-3
16		-6D
21		-16
116		-151D
104	AN894-D8-5	
21		-12 8
21		-12-18
25	AC895-BB2	
45		-6D
21		-32
2,761		-B71
100		-B75
50		-B76
1,140		-D80
452		-81
60		-D84

Pieces		
19	AC905-B8	
203		-B10
11,877	AC908-20	
220	AN909-20	
195	AN910-1	
64		-2
48		-6
363	AN911-6D	
67	AN912-2	
162		-5
424		-5D
24		-10D
120		-13
24		-1
35		-1D
302	AN913-2D	
46		-10
1,064		-20
328	AN914-1D	
50		-2D
85		-3D
10		-4D
139		-6D
907	AN915-2	
129		-2D
85		-2D
129		-8D
121		-4
31		-16D
81	AN916-1	
27		-1D
253		-2D
48		-4D
110		-6D
137	AN917-1	
15		-4
65		-4D
32		-6
218		-10D
226	AN918-3D	
132	AN919-1	
1,106		-3
23		-3D
32		-4D
41		-13
408		-14D
185		-19
122		-24D
1,328	AN920-4D	
370		-6D
716		-8D
80	AN921-2D	
2,948		-6D
1,488		-8D
28		-10D
41	AN921-12D	
49		-16D
53	AN922-12D	
30	AN923-2D	
35		-3D
56		-4D
45		-6D
28		-12D
260	AN924-2D	
1,701		-24D
79	AN925-8D	
77		-10D
131		-12D
47	AN926-4D	
42		-6
19		-12D
167		-16D
23		-20D
50	AN927-16D	
26	AN928-8D	
34		-10D
1,086	AN929-3Z	
29	AN932-3	
65		-4
50	AN933-B1	
67		-D2
10		-D3
59	AN937-4D	
108	AN939-4	
136		-8D
46		-10D
21		-12
209	AN941-10	
74	AN4077-1	
345	AN6285-1	

ER FITTINGS

Piece		
42	ER776-4D	
55		-8D
55		-12D
95	ER778-8D	
40		-10D
40		-12D
181	ER804-4D	
31		-6D
20		-8D
104		-10D
15	ER806-4D	
10		-5D
13		-6D
15		-8D
242	ER815-4	
778		-6D
539		-8D
250		-10D
146		-12D
136		-16D
142		-24D
240	ER816-20D	
250	ER817-6	
28,900		-10D
1,419		-12D
1,466		-16D
4,843		-20D
243		-24D
2,930	ER819-10	
397		-10D
500		-12
1,945		-16
5,013		-20
1,536		-24
43	ER821-4D	
151		-6D
23		-8D
455		-10D
367	ER824-4D	
233		-6D
109		-8D
146		-10D
243	ER824-12D	
28	ER825-4D	
29	ER827-4D	
27		-6D
45		-8D
24		-12D
1,365	ER832-4D	
984		-6D
38		-8D
131		-10D
59		-12D
322		-16D
249	ER832-20D	
79		-24D
79	ER833-4	
126		-4D
160		-6
50		-6D
146		-10D
84		-12D
145		-16D
141		-20D
122		-24D
57	ER834-4D	
72		-6D
33		-8D
23		-10D
21		-12D
40		-24D
572	ER837-4	
3050		-4D
193		-6
768		-6D
64		-8D
37		-10D
19		-12D
27		-20D
172		-24D
317	ER894-D4-4	
80		-D6-6
116		-D8-7
28		-D10-10
23		-D12-12
217	ER919-6D	
56		6
30		-7D

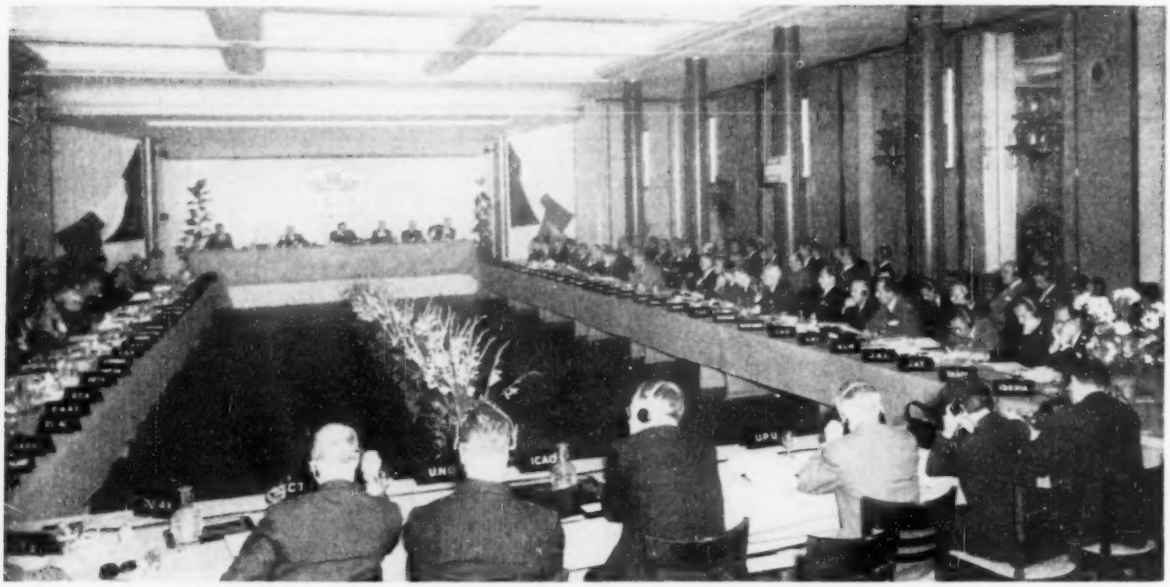
TERMINALS & TURNBUCKLES

(Assemblies & Parts)

Pieces		
1,884	AN150-16S	
500		-46S
1,779	AN155-5S	
1,300		-8S
2,136		21S
398		-36L
672		-125L
920	AN160-8S	
1,519		-16LR
95		-21SR
311		-32RL
2,499		-32S
1,575		-32SL
160		-46RS
3,718		-46S
374	AN161-5RS	
374	AN161-5RS	
1,229		-16LR
595		-22LH
1,458		-22RH
1,927		-22LS
102		-32SR
10,502		-32LL
3,523		-32LL
492		-46LL
1,123		-46RL
32		-46LS
309		-46RS
2,368		-61RS
5,643	AN165-8RS	
144		-21LR
736		-21LS
817		-21RL
813		-21RS
1,005		-22RS
18,213		-32RL
43		-32RSJ
156		-46L
2,644		-46RL
35		-46RS
469		-46LR
167		-61LR
98	AN170-16LS	
6,500	AN659-6	
2,425		-7
6,883		-9
7,418		-10
4,559		-11
3,009		-14
824		-29
283		-31
1,550	AN660-1	
32,585		-2
47,562		-4
49,143	AN660-3	
39,748		-5
1,480		-6
26,650		-6
28,306		-7
2,692		-8
80		-20
129,552		-50
1,249		-65
51	AC663-6C	
184	AN664-5	
16		-6
32	AN665-12	
631		-21L
763		-46R
14		-61L
445		-115R
4,642	AN666-1	
2,610		-3
770		-4LH
2,050		-5
12,878		-8
1,397	AN667-F3	
1,931		-F6
1,057		-F8
65	AN668-F2	
962		-3
658		-F3
3,298		-5
1,526		-F5
10,307		-6
719		-F6
43		-9
210		-F9
230		-10-6
120	AN669-FS2LH	

COMMERCIAL SURPLUS SALES CO.

4101 CURTIS AVE., BALTIMORE 26, MARYLAND — **Tel: CURTIS 7-3300**



WORLD AIRLINE DELEGATES at the 10th annual general IATA meeting get translations of addresses via interpreters over earphones.

IATA Looks to Air Cargo for New Profits

- **Hildred says expansion of airfreight would increase revenues but warns of risk in buying the equipment.**
- **Committees suggest faster development of shorthaul copter services to solve airlines' financial problems.**

By Frank Shea, Jr.

Paris—The world's scheduled airlines, fighting ever-rising operating costs and increased government taxation without revision of their fare structure, are looking for other ways to boost sagging profits and strengthen the economic foundation of the industry.

One major potential solution, virtually neglected up to now, is worldwide development of air cargo, delegates to the 10th annual general meeting of the International Air Transport Assn. here were told.

▶ **Resourceful Expansion**—IATA director general Sir William P. Hildred, in open discussion, told the meeting the time has come to give as much impetus to airfreight development as airlines have to development of passenger services over the years.

An industry that has digested the complex international pattern of fares for first-class, aircoach and even Class "B" service should be able to direct its ingenuity and resourcefulness to expansion of the cargo picture, he said.

Expressing the hope that the level of cargo fares might be substantially reduced, he said that while you cannot ship goods via coach, increased use of the all-cargo aircraft might be the answer.

▶ **Considerable Risk**—"But it will not be easy," he warned. "The cost of any aircraft today is high and going higher. Purchase of this type equipment involves considerable risk.

"The recent experience of certain cargo operators in this connection has involved them in an unhappy and even vicious circle: Rates cannot be decisively reduced until all-cargo aircraft are available, yet the absence of such aircraft keeps rates high and traffic restricted."

Sir William said the artificial stimulus to all-cargo traffic resulting from abnormal political conditions has put more freight transports into operation. "But once the stimulus is removed, the problem of what to do with the aircraft in normal commerce remains," he added.

The IATA director general was quick to point out that he threw these pessimistic considerations in more as a challenge than a deterrent, holding that the industry has taken equal if not more serious risks in pioneering in the passenger field over the years.

▶ **Copter Potential**—Another important point of discussion at the meeting was airline efforts to accelerate development of the helicopter for widespread scheduled service, held out as another avenue for the bolstering of revenues through additional traffic.

IATA's technical committee said airlines and the general public no longer think of the helicopter as being of potential interest to the air transport industry at some nebulous future date, pointing to its present use in passenger operations.

"It is true that in its present stage of development the application of the helicopter transport is still limited due to the economics of the present machine," the committee said.

"Nevertheless, here again we have given the manufacturers, in good time from the industry's overall viewpoint, an outline of the type machine we need to make the project attractive economically as well as technically, and are already about to see prototypes showing far greater promise of adaptability for public transportation than heretofore."

The committee went on to estimate that a commercially suitable copter could be delivered soon.

▶ **Shorthaul Edge**—Big advantage of a commercially suited helicopter from

for use... at 60° below

This CF-100 has had overnight "Cold Soak".

The CF-100 with its ORENDA's was meant to fly and fight in the Arctic. So that's where it's been tested. In the bitter wind-searing cold, engines must start, controls move, radio be clear, guns fire, and the pilot's hands and feet be comfortable within minutes after a "Barren Land" alert.

It's routine now to leave a CF-100 out overnight with but a light wrap to keep the wings clear of frost. After a 15-hour "cold soak" in temperatures of 30° to 60° below they pull the wraps, flick switches and take off. If it's not cold enough at Namao, near Edmonton, they fly non-stop to Fort Churchill on Hudson's Bay.

Defender of the Arctic, the CF-100 is in squadron service with the R.C.A.F. at strategic bases. On daily flights, it probes the perimeter of those areas most likely to need watching.

CF-100, WORLD FLIGHT RECORD—*the 2100 miles from Vancouver to North Bay was recently flown non-stop by a CF-100 in 3 hours, 50 minutes at 550 M.P.H. Piloted by F/L M. Kobierski with F/ L D. Turner, Navigator, this was one of many tests performed by the CF-100's of 445 All Weather Squadron, R.C.A.F., Uplands, Ontario. It is the longest non-stop flight completed by a fighter aircraft.*

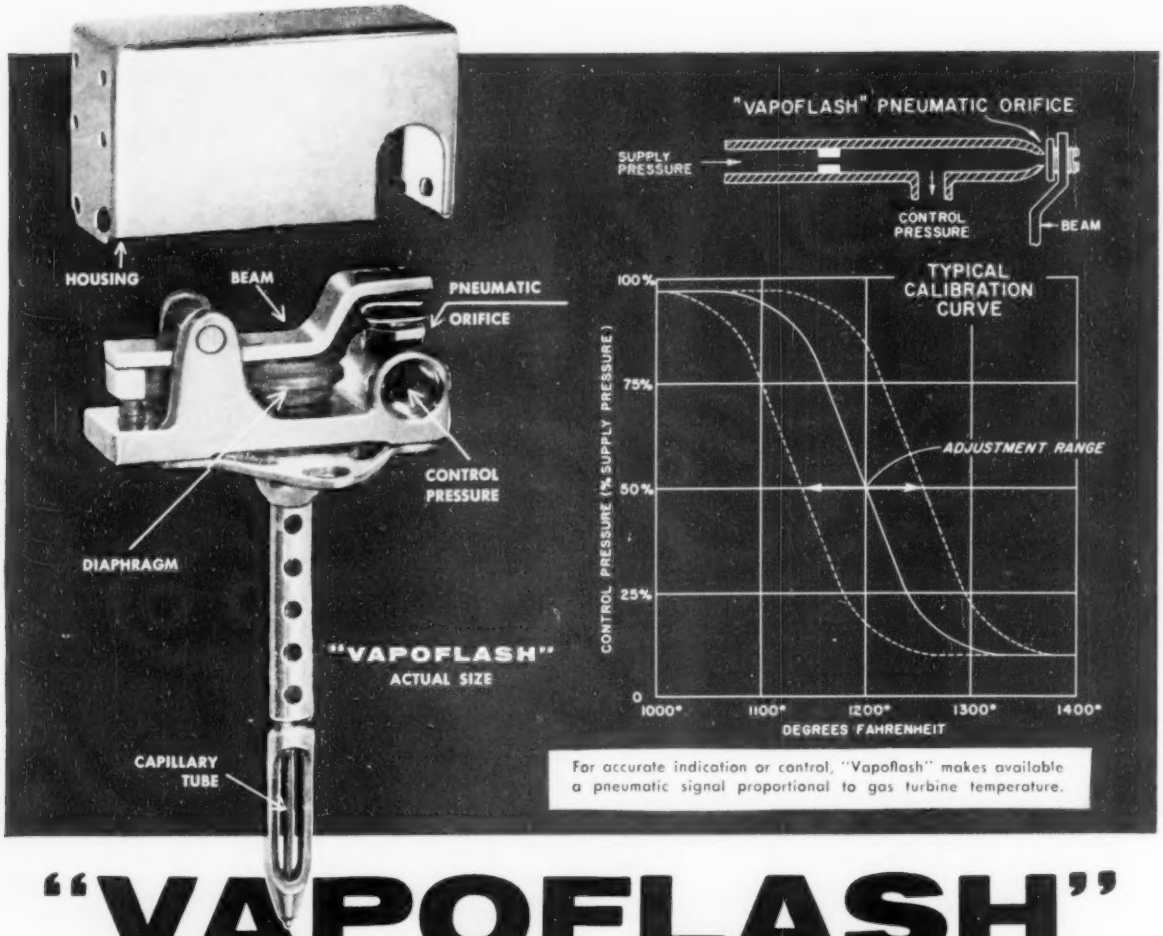
Ground Crew enjoys heat from quick starting ORENDAS

AIRCRAFT DIVISION

A.V. ROE CANADA LIMITED

MALTON, ONTARIO

MEMBER OF THE HAWKER SIDDELEY GROUP



"VAPOFLASH"

. . . an entirely new development in gas turbine control components

"Vapoflash" — a unique new measuring probe — provides the advantage of high-gain, pneumatic output. The power level of the control signal is such that greatly simplified mechanisms can be applied to modulate main engine and afterburner fuel flow, and the exhaust nozzle area of turbojet engines.

The accurately calibrated "Vapoflash" probe exposes a mercury-filled capillary tube to the gas stream of the jet engine. As the gas temperature rises to the control set point, the pressure of the vaporized mercury in the element develops a signal which is measured by a metal diaphragm. As the diaphragm moves, it actuates a preloaded cantilever beam which operates a pneumatic orifice. Compressor discharge pressure serves as supply pressure: adequate power is conveniently available for control actuation. With several "Vapoflash" units connected in parallel for averaging, reliable measurement and control of gas turbine temperatures is simplified.

We are confident that our long experience in developing, manufacturing and testing jet engine control components can be of practical service to you. Our engineering department will welcome the opportunity to analyze your control requirements.

MANNING, MAXWELL & MOORE, INC.

AIRCRAFT PRODUCTS DIVISION • STRATFORD, CONN. • DANBURY, CONN. • INGLEWOOD, CALIF.

OUR AIRCRAFT PRODUCTS INCLUDE: TURBOJET ENGINE TEMPERATURE CONTROL AMPLIFIERS • ELECTRONIC AMPLIFIERS PRESSURE SWITCHES FOR ROCKETS, JET ENGINE AND AIRFRAME APPLICATIONS • PRESSURE GAUGES THERMOCOUPLES • HYDRAULIC VALVES • JET ENGINE AFTERBURNER CONTROL SYSTEMS.

NEW IATA PRESIDENT Juan T. Trippe (right), who will serve 1955-1956 term, is congratulated by Max Hymans (left), Air France president and head of IATA for coming year. Sir William Hildred, IATA director general, joined in congratulations. Election of Pan American World Airways president Trippe means the U. S. will be host in 1955.

IATA airlines' standpoint, especially those in Europe, is its potential for shorthaul operations. It is well known that most shorthaul services presently are unable to cover their costs and that the most profitable airline operations lie in the longhaul passenger market.

One of the main reasons for the economic problems of the shorthaul routes, the committee said, is the inadequate utilization of aircraft—with a high number of landings in proportion to distances flown.

In addition, the committee said, the shorthaul operator must face strong passenger preferences for travel at particular times of day. Travelers do not want to arrive at an airport late at night, then ride for another hour from the terminal to the city.

The helicopter, with its facility for landing in downtown areas, would relieve this problem, the committee pointed out.

▶ **Direct Solution**—Since realization of any considerable profit from either cargo expansion or helicopter operations still lies somewhat in the future, IATA airlines also are working toward a more immediate and direct solution to their economic dilemma—that of cutting operating costs to a bare minimum.

Operating under a two-fold program the IATA terms its "facilitation" campaign, member carriers are making a concentrated effort to reduce international red tape and to streamline their internal organizations. The association firmly believes this campaign alone can save millions of dollars annually.

"It will go a long way toward establishing a better ratio between costs and profits," said one member.

▶ **Red Tape 'Rut'**—Facilitation originally referred to a simplification of governmental procedures—procedures which cost the airlines a great deal. It was found, however, that these procedures go hand in hand with those of airlines. IATA's executive committee reported the carriers are as much in a "rut" with red tape as their respective governments.

Typical example cited was the passenger manifest. IATA has been staging an intensive effort to have governments eliminate them, but certain airlines maintain they need them to complete records on ticket coupons, etc.

One particular airline that eliminated one copy of the manifest, however, had the following to report:

By abolition of a single copy of this document used for statistical purposes on its own services it has saved anually 300,000 sheets of duplication paper, 300,000 statistical reports, 12,500 clerical manhours, filing space for 600,000 sheets and the carriage of 8,000 lb. of company mail.

This medium-size airline, it was pointed out, accounts for about 5% of the world's traffic, and there are on the average, 11 copies of each manifest. Multiplication of these figures 20 times gives an approximation of the unnecessary effort and expense the industry is devoting to one document.

▶ **'No Show' Solution**—Another serious problem IATA hopes to be able to iron out in the near future is the "no show."

Ray W. Ireland, vice president of United Air Lines, estimates that no shows are costing airlines about $60 million a year.

Ireland said one solution to this problem lies in a tightening of airlines' reservations systems along with some means of persuading the public to give advance notice of cancelation.

Overseas Charters May Stop Filing Rates

Civil Aeronautics Board plans to end the requirement for filing tariffs on overseas military charter operations to eliminate pointless paper work.

The Board says it lacks power to prescribe rates for international operations and "is unable to take effective" action even though tariffs at uneconomic levels are filed.

Although it does have authority to investigate and remove cases of "unlawful discrimination" in foreign operations, CAB says this authority is not well adapted to military charter operations for special situations and short periods. Before investigation could be completed, CAB adds, "the transportation would generally have taken place, rendering control ineffective."

Pointing to "the uneconomic low levels to which military charter rates have fallen as a result of the policy of unrestricted bidding and a temporary excess of available capacity for charters following the termination of the Korean airlift," the Board says that since it cannot effectively deal with the problem, "reliance must be placed upon the Department of Defense for any rate stabilization in this field."

Interested parties must submit views or arguments on the proposed rule change by Oct. 18.

CAA Sets Up New Approach Light Rules

New standards for approach light installations have been set up by Civil Aeronautics Administration. The new rules will set the standard for any future CAA approach lighting systems and will govern approval of the use of federal funds for such installations.

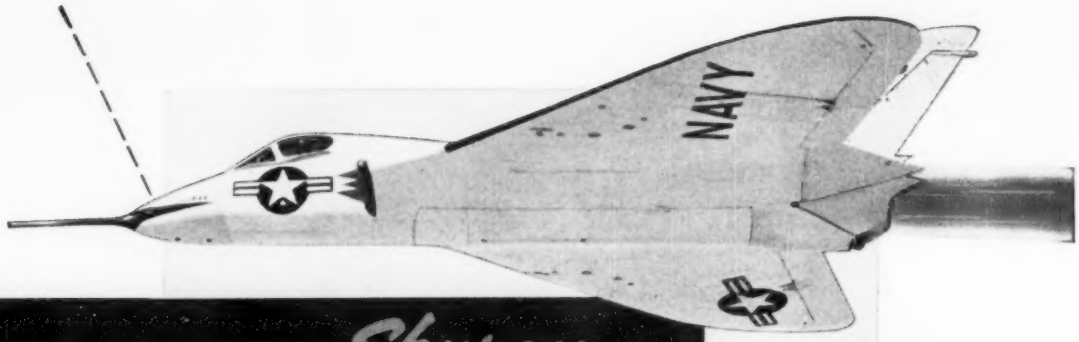
The requirements were formulated by a subcommittee of the Air Coordinating Committee as the national standard on approach lighting.

Three configurations are specified, all requiring two threshold bars and one or more cross bars.

One configuration is to be installed at the approach end of an instrument runway with no designation for an overrun area. A second would be used at the approach end of an instrument runway where an overrun area is designated. The third configuration has only military application.

The systems are supposed to be 3,000 ft. long. Authority can be obtained for shorter systems where terrain or other problems intervene.

Airports with frequent very low visibility will install sequenced flashing lights when CAA and local studies indicate they are necessary.



Douglas F4D Skyray, equipped with South Wind Model 936-A Oil Cooler

For the Douglas *Skyray*
and *every* heat transfer need...

LIGHTWEIGHT, THINWALL

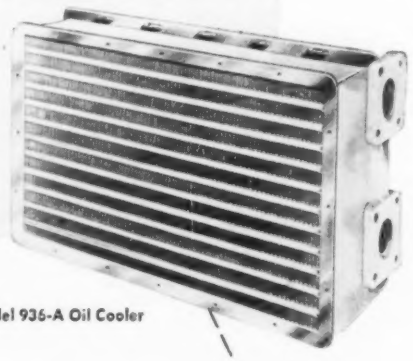
heat exchangers

This South Wind Oil Cooler was chosen for the fabulous Douglas Skyray. It is but one of many heat exchangers developed by South Wind to meet the challenge of higher temperatures in advanced jet engines. These heat exchangers fully comply with the rigid specifications set up by airframe and engine manufacturers, as well as the makers of air cycle cooling packages.

Stainless Steel or Aluminum— To Meet Your Specific Design Needs

South Wind is now designing and fabricating lightweight, thinwall heat exchangers in both stainless steel and aluminum for many different applications. The new heat exchangers are available with either the tube bundle or the plate and fin type of design . . . whichever the job requires.

Air-to-air, liquid-to-liquid, or air-to-liquid—whatever your need in heat transfer equipment—South Wind's experienced engineering staff will be glad to consult with you. For information, write Stewart-Warner Corp., South Wind Division, 1514 Drover St., Indianapolis 7, Ind.



Model 936-A Oil Cooler

South Wind
reg. U. S. Pat. Off.

A PRODUCT OF SW STEWART WARNER

AIRCRAFT HEATERS
HEAT EXCHANGE EQUIPMENT
INERT GAS GENERATORS

ATA, ALPA Clash on Heat Rule

Temperature and humidity no takeoff hazard, airlines claim; but pilots say 100% accountability is needed.

Temperature and humidity variations affect performance of an aircraft during takeoff but there is no evidence they constitute a hazard to airline operations, Air Transport Assn. claims.

Opposing a proposal at the fifth annual Civil Aeronautics Board Airworthiness Review in Washington, D. C., for an increase to 100% temperature and humidity accountability in calculating takeoff weights, ATA argued that the present 50% rule is more than sufficient.

▶**ATA Reasoning**—Changes in Part 4B. 117 of the Civil Air Regulations, sought by Air Line Pilots Assn., are not needed, ATA says, because:

- Additional temperature and humidity accountability for piston-powered airplanes will not improve measurably the basic safety level.
- The effect of unneeded weight removals will seriously impair the industry's ability to make high weight modifications or improvements where basic safety really is involved.
- The economic effect of unwarranted weight removals will be serious and unjustified.

▶**ALPA Forecast**—Despite the good safety record cited by the scheduled airline organization—nearly 4 million takeoffs since early 1948 without an accident that can be blamed on insufficient correction of weight to meet temperature and humidity conditions—the pilots say "it is only a matter of time before we will lose a plane." ALPA contends:

- There is "wide recognition" that increased accountability is needed for hot, humid days.
- Some airlines voluntarily have put in effect their own requirements to meet these conditions.
- The safety record is good because of engine reliability and not because of adequate performance requirements when one engine is inoperative.

Upshot of presentations at the CAB review is that ALPA representatives will ask their members to study ATA's arguments and reconsider their demands. Pilot delegates to the review were under a mandate from ALPA to press for a change in 4B. 117.

CAB spokesmen say the union will get another chance to present its case after considering facts brought out in the ATA study.

▶**Accident Record**—The ATA report included a study of the accident records since introduction of the 50% temperature accountability rule in 1947. During that time, there have been 154 accidents involving at least substantial damage. In none of them, according to ATA, was performance considered a factor.

Citing the cases of three Convair Liner accidents (at Memphis, Tulsa and Buffalo), the airline association used CAB reports to prove the first two were caused by low airspeeds in combination with flap retraction. The Buffalo crash was attributed to incorrect unfeathering procedure.

Says ATA: "No reasonable amount of weight removal would have made the airplanes flyable under conditions flown at the time of the accidents."

Other ATA contentions include:

- The great majority of engine failures are not complete and instantaneous and are not likely to occur at the most critical time in takeoff.
- There are "hidden margins," such as ground effect, that improve airplane performance beyond the standard required in the present regulations.

ATA holds that this results in 75% temperature accountability under the existing 50% rule.

- It is common practice for pilots to accelerate close to the runway before establishing climbs. This is done to avoid an uncomfortably noshigh attitude that might annoy the passengers, but on a hot day it also can take the plane close to obstacles in the takeoff area.

Airlines stress the importance of using available power for climb in the initial stages of takeoff.

- The payload penalty that would be suffered by the airlines with full temperature and humidity accountability would be substantial. Studies at Chicago indicate that Trans World Airlines alone would lose $150,000 a year in coach revenue.

▶**Turbine Power**—Other major topics discussed at the Airworthiness Review were requirements for turbine-powered transports and transport helicopters.

Revision of CAR Part 4B to make it applicable to turbine-powered aircraft centered on definitions, fuel rate flow, hot weather operations, induction systems, fire zones and other safety items.

CAB chairman Chan Gurney says the meeting was taking only the initial steps toward formulation of airworthiness requirements for turboprop planes.

Comments of the industry, airlines and Civil Aeronautics Administration will be studied and subjected to further review.

▶**Copter Transports**—The committee on transport helicopter requirements went over proposed changes in Part 6 of CAR, designed to make them applicable to rotary-wing aircraft.

In general, however, the session was limited to a broad discussion because government agencies and the industry reported that more study and experience is needed before firm rules can be set down.

Among the topics discussed were weight limitations, number of engines, effect of altitude, temperature and humidity, flight characteristics, cockpits, evacuation and powerplant installation.

CAA Control Tower Operations Increase

A report on Civil Aeronautics Administration's airport traffic control tower operations shows total operations for fiscal 1954 increased by more than a million over 1953.

They total 17,261,461 for 1954, 16,214,716 for 1953.

Twelve towers registered more than 200,000 operations: Chicago (Midway), 349,360; Los Angeles, 277,085; Miami, Fla., 268,419; Honolulu, 255,385; Cleveland, 246,372; Denver, 234,027; New York (LaGuardia) 233,563; Atlanta, 222,147; Long Beach, Calif., 205,401; Dallas, 204,626; Teterboro, N. J., 203,795, and Wichita, 202,850.

The total of operations increased by 6% over fiscal 1953. Airline operations jumped 7%; military itinerant operations were up 17%; military local traffic gained 15%, and civil itinerant operations increased 10%.

Only civil local operations showed a decline, with a 5% drop.

Fix postings recorded at CAA air route traffic control centers reached 15,619,680, an increase of 9% over the 1953 figures of 14,329,408.

The Los Angeles center area registered the greatest number of instrument approaches, with 45,058—nearly 10% of the total of 456,682. Seattle was second with 41,590.

MATS, Civil Airline Overlap to Be Studied

Selig Altschul, New York aviation consultant, will make a study of Military Air Transport Service for the transportation subcommittee of the Hoover Commission's Committee on Business Organization of the Department of Defense.

Study is designed to give the committee data on possible duplication of MATS and commercial airline operations. Recommendations will be made on the best methods to use the country's air transport resources at the lowest cost to the taxpayer.

Studies also are to be made of De-

fense Department's management of passenger and freight traffic. James Knudsen, former member of Interstate Commerce Commission and of the Office of Defense Transportation, will direct the passenger traffic study. John R. Staley, Chicago, vice president-traffic of Quaker Oats Co., will direct the freight traffic study.

CAB ORDERS

(Sept. 9-Sept. 15)

GRANTED:

Flying Tiger Line's application for an exemption to make a charter passenger flight from Lisbon, Portugal, to Boston.

Slick Airways and Flying Tiger Line's application for leave to intervene in the case involving domestic trunkline mail rates.

Allegheny Airlines' application for a temporary exemption allowing it to overfly certain points on Route 97, with certain restrictions.

Piedmont Aviation's application for leave to intervene in the case involving direct nonstop air service between Norfolk, Va., and Atlanta, Ga. Colonial Airlines' petition for the same purpose is dismissed.

Central Airlines' application for a temporary exemption allowing it to engage in specified service to Norman, Okla.

DISMISSED:

W. Dev Lomax' application for a certificate for nonscheduled service in the Western Pacific, by default.

Mercury Airlines' application for a certificate of public convenience and necessity, by default.

Princeton Airport's application for a certificate of public convenience and necessity, by default.

Capital Airlines' application for service to Richmond, Va., as a stop on its Washington-Norfolk route. Capital chose not to press its application at present.

Chamber of Commerce Studies Airline Policy

The transportation and communications department of the U. S. Chamber of Commerce is considering a number of proposals for chamber transportation policy.

Policy suggestions presented to the committee include these proposals from airline representatives:

- Government policy be tightened on exemptions under which nonscheduled air carriers operate.
- Local service airlines be given a more stable guarantee of being able to continue to operate, if not by permanent certificates then by extension of the present term of certification.
- A specific policy be set up by governing government competition involving such services as the Military Air Transport Service.
- User charges for transportation media, such as the federal airways, be studied and recommendations be made for a reasonable schedule of charges.

A special subcommittee will review the air policy report of the Air Coordinating Committee and study its relation to chamber policy.

The committee reaffirmed past policy, favoring the repeal of Section 22 that governs rates involved in government contracts with private transportation media.

All proposals will be reviewed by the transportation committee and recommendations made for policy changes or new policy to the chamber when it convenes for its annual meeting in May.

SHORTLINES

► **Allegheny Airlines** reports passenger traffic for August up 35% over last year. Scheduled miles flown were up 30%, load factor hit a record 55%.

► **Avianca** is concluding a deal with Lockheed for two more Super Constellations. The Colombian carrier has three Super Connies scheduled to go into service Oct. 1.

► **Central Airlines** observed its fifth anniversary this month. During the past five years, Central carried 162,980 passengers, flew 22,864,000 passenger-miles.

► **Northwest Orient Airlines** set two new marks in August when 127,713 passengers were flown 101,320,000 passenger-miles over domestic and international routes.

► **Pioneer Air Lines** flew a record 5,002,200 revenue passenger-miles during August, topping the previous high of 4,990,660 set in October 1952. Pioneer carried a total of 16,416 passengers, a 17% increase over July and a 56% gain over August 1953. Mail climbed 127% to 18,680 ton-miles; air express increased 119% to 6,598 ton-miles, and air-freight gained 46% to 14,750 ton-miles.

► **Resort Airlines** will open its winter cruise program through the Caribbean Dec. 5. Cruises run from one to two weeks, range from $236.90 to $399.90.

► **Western Air Lines** starts nonstop service between Los Angeles and Seattle/Tacoma this week when four new DC-6Bs go into service. New flights will follow the pattern of WAL's champagne-and-orchids "Californian" service and will feature a special eight-passenger compartment for business conferences.

AVIATION CALENDAR

Sept. 30-Oct. 1—Radio Technical Commission for Aeronautics, fall assembly, Washington, D. C.

Oct. 1-2—Airmail Pioneers, division reunion, Lexington Hotel, New York.

Oct. 4-6—Tenth annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 5-7—Champion Spark Plug Co., 10th annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

Oct. 5-9—Society of Automotive Engineers, National Aeronautics Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

Oct. 11-12—Aircraft Industries Assn., symposium on titanium parts, Cleveland.

Oct. 13-14—American Assn. of Airport Executives, 1954 conference on airport management and operations, University of Oklahoma, Norman, Okla.

Oct. 14-15—Illinois Institute of Technology and Armour Research Foundation, National Conference on Industrial Hydraulics, Sheraton Hotel, Chicago.

Oct. 14-15—Institute of the Aeronautical Sciences and Canadian Aeronautical Institute, joint meeting, Montreal.

Oct. 17-22—International Union of Aviation Insurers, annual meeting, New York.

Oct. 18-19—American Society of Mechanical Engineers and American Society of Lubrication Engineers, lubrication conference, Lord Baltimore Hotel, Baltimore.

Oct. 18-22—National Safety Council, Aeronautical Section, Conrad Hilton, Chicago.

Oct. 19-20—Seventh annual New York State Airport Development and Operation Conference, Syracuse, N. Y.

Oct. 21-23—American Society for Quality Control, eighth New England conference, Ten Eyck Hotel, Albany, N. Y.

Oct. 23—Airmail Pioneers, division reunion, VFW Club, Elmhurst, Ill.

Oct. 28-29—Aircraft Electrical Society, 11th annual display meeting, Pan Pacific Auditorium, Los Angeles.

Nov. 1-5—American Welding Society, fall meeting, Sherman Hotel, Chicago.

Nov. 4-5—Airborne and navigational electronics, East Coast conference, Sheraton-Belvedere Hotel, Baltimore.

Nov. 8-9—National Aviation Trades Assn., annual convention and meeting, Biltmore Terrace Hotel, Miami Beach, Fla.

Nov. 8-10—Air Industries & Transport Assn. of Canada, annual meeting, Chateau Frontenac, Quebec City.

Nov. 9-12—Air Line Pilots Assn., convention, Sheraton Hotel, Chicago.

Nov. 10-12—Industrial Management Society, 18th annual time and motion study, Hotel Sherman, Chicago.

Nov. 11-12—Airmail Pioneers, division reunion, Hollywood Roosevelt Hotel, Los Angeles.

Nov. 12-13—National Symposium on Quality Control and Reliability in Electronics, Statler Hotel, New York.

Nov. 14-17—Aviation Distributors and Manufacturers Assn., 12th annual meeting, Mayflower Hotel, Washington, D. C.

Nov. 17-19—California Assn. of Airport Executives, semi-annual meeting, Claire Hotel, San Jose, Calif.

Nov. 29-Dec. 3—American Society of Mechanical Engineers, Aviation Division, annual meeting, New York.

WHY IT PAYS TO BUY MX SCREW STOCK FROM US

You get reduced production costs—quick delivery

● Hundreds of shop cases have shown that USS "MX" free-machining bar stock cuts unit costs considerably . . . an average of 10% to 15%, sometimes as high as 42%. And the more machine work your parts require, the greater the savings.

Here's how you cut costs when you use "MX" rather than other free-machining grades:

You get more parts per hour, longer tool life with less down time for grinding and adjustment, fewer rejects, closer tolerances and better part finish.

One of our qualified sales representatives will gladly discuss the advantages of "MX" with you as they apply to your particular shop requirements. And you can always depend upon quick delivery from the nearest U.S. Steel Supply warehouse.

In addition to "MX" stock, we carry: cold finished rounds, squares, hexagons, flats and precision shafting in all grades.

TRIPLE SECURITY

What you want
When you want it
At the **right price**

U. S. STEEL SUPPLY

DIVISION

General Offices
208 So. La Salle St., Chicago 4, Ill.

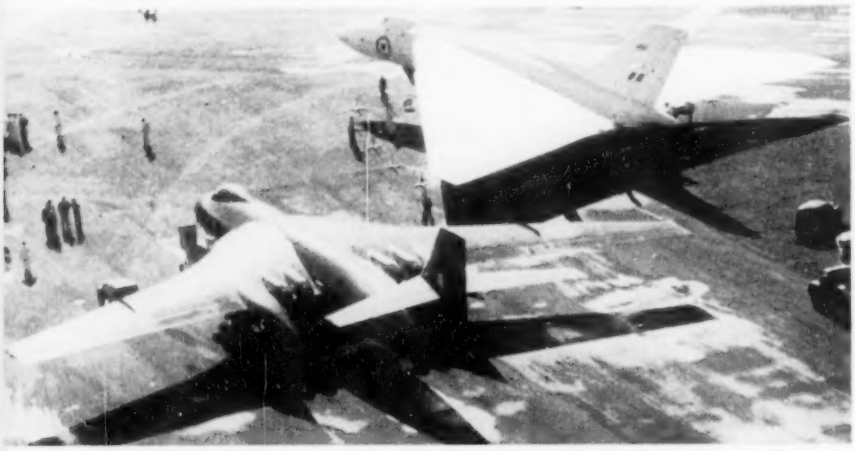
Warehouses and Sales Offices
Coast to Coast

USS STEEL
UNITED STATES STEEL

UNITED STATES STEEL

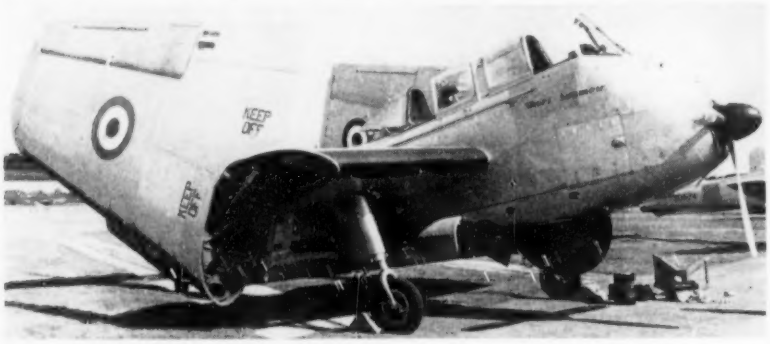
British Show New Planes At Farnborough

HANDLEY PAGE VICTOR (second prototype) began flight tests during week of the show.



VICKERS VALIANT (foreground) and Avro Vulcan, show crowds swept and delta wings.

HAWKER HUNTER Mk.6 opens brake.



SHORT SEAMEW turboprop anti-sub plane (left) has its wings folded, is fitted with a radome just ahead of large, open bomb-bay.

FOLLAND MIDGE (below), prototype of lightweight Gnat fighter, was considered star of SBAC show (Aviation Week Sept. 20, p. 13). Speed is 603 mph. Wingsweep is 40 deg.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—SEPTEMBER 27, 1954

ADEL DIV., GENERAL METALS CORP. 38
Agency—The McCarty Company
ADVANCE ELECTRIC & RELAY COMPANY 52
Agency—Western Adv. Agency, Inc.
AEROQUIP CORPORATION 69
Agency—The Fred M. Randall Company
AIRCOOLED MOTORS, INC. 33
Agency—Richards & Webb, Inc., Adv.
AIRCRAFT POROUS MEDIA, INC. 72
Agency—Clinton Advertising, Inc.
AIRWORK CORPORATION 61
Agency—Geare-Marston Adv.
ARMA DIVISION AMERICAN BOSCH ARMA CORP. 12
Agency—Doyle, Kitchen & McCormick, Inc.

B. H. AIRCRAFT CO., INC. 42
Agency—Harold Marshall Adv. Co., Inc.
BOEING AIRPLANE COMPANY 36
Agency—N. W. Ayer & Son, Inc.
BREEZE CORPORATIONS, INC. 63
Agency—Burke-Dowling-Adams, Inc.
BRIDGEPORT BRASS COMPANY (ALUMINUM DIV.) 53
Agency—Hazard Advertising Company

C & H SUPPLY COMPANY (METAL-CAL) 74
Agency—Heintz & Co., Inc.
CHANCE VOUGHT AIRCRAFT, INCORPORATED 11
Agency—Lennen & Newell, Inc.
CLIFTON PRECISION PRODUCTS CO., INC. 44
Agency—Ivey Advertising Company
CONNECTICUT HARD RUBBER COMPANY 45
Agency—Treland, Incorporated
CONSOLIDATED DIESEL ELECTRIC CORP. 67
Agency—Woodward & Byron, Inc.
CONSOLIDATED VULTEE AIRCRAFT CORP. ..... Front Cover
Agency—Buchanan & Co., Inc.
COOK ELECTRIC COMPANY 65
Agency—Glenn-Jordan-Stoetzel, Inc.
CORNELIUS COMPANY, THE 86
Agency—Dwyer & Devos Adv.

DAYSTROM INSTRUMENT DIV. DAYSTROM, INCORPORATED 78
Agency—Morse Advertising Agency
DOW CORNING CORPORATION 9
Agency—Wagnitz Advertising, Inc.

EASTERN INDUSTRIES, INCORPORATED 48
Agency—Reisen Adv. Agency, Inc.
EDISON, INC., THOMAS A. (INSTRUMENT DIVISION) 31
Agency—Gayner & Company, Inc.
EDO CORPORATION 28
Agency—Davis, Parsons & Strohmeier, Inc.
ELASTIC STOP NUT CORP. OF AMERICA ..... Fourth Cover
Agency—G. M. Basford Company

FORD INSTRUMENT CO. 6
Agency—G. M. Basford Co.

GENERAL ELECTRIC COMPANY 54, 55, 56, 57
Agency—G. M. Basford Company
GIANNINI & CO., INC., G. M. 85
Agency—Western Adv. Agency, Inc.
GILFILLAN BROTHERS 22
Agency—Erwin, Wasey & Co., Ltd.
GLADDEN PRODUCTS CORP. 68
Agency—Walter C. Dawson Co.
GOLDAK COMPANY, THE 30
Agency—Simonic Adv. Agency
GOODYEAR AIRCRAFT CORP. 27
Agency—Kudner Agency, Inc.

HARDMAN TOOL & ENGINEERING CO. 33
Agency—The Essig Company
HECKER COMPANY, A. W. 82
Agency—H. Grider Adv., Inc.
HOLLEY CARBURETOR CO. ..... Second Cover
Agency—Holcen-Chapin-Larrie, Inc.

INTERNATIONAL NICKEL CO., INC., THE 64
Agency—Marschalk & Pratt Co., Inc.

JAMES-POND-CLARK 88
Agency—Western Adv. Agency, Inc.

KAWNEER COMPANY, THE (AIRCRAFT PRODUCTS DIV.) 40
Agency—Fuller & Smith & Ross, Inc.
KIDDE & CO., INC., WALTER 3
Agency—Cunningham & Walsh, Inc.

LIBRASCOPE, INCORPORATED 89
Agency—Western Adv. Agency, Inc.
LOCKHEED AIRCRAFT CORP. 75
Agency—Dorpalen & Cox, Inc.
LORD MANUFACTURING COMPANY 49
Agency—Davies & McKinney Adv.

MANNING, MAXWELL & MOORE, INC. 98
Agency—Fuller & Smith & Ross, Inc.
MENASCO MANUFACTURING COMPANY 88
Agency—The McCarty Co. Adv.
MONOGRAM MFG. CO., A DIVISION OF LEWIS & KAUFMAN LTD. 8
Agency—Tatnall & Young Adv.

NORTHROP AIRCRAFT, INC. 29
Agency—West-Marquis, Inc.
NUTT SHEL COMPANY 62
Agency—Welsh, Hollander & Coleman Adv.

OLIVER CORPORATION, THE (AIRCRAFT DIV.) 60
Agency—Richard E. Putt Adv.

PACIFIC DIVISION BENDIX AVIATION CORP. 47
Agency—The Shaw Company Adv.
PACIFIC SCIENTIFIC COMPANY 85
Agency—The Martin R. Kitten Co., Inc.
PASTUSHIN AVIATION CORP. 25
Agency—Lotis-Western, Inc.
PERMACEL TAPE CORPORATION 39
Agency—The Aitkin-Kynett Co. Adv.
PHILLIPS PETROLEUM CO. 5
Agency—Lambert & Feasley, Inc.
PRATT & WHITNEY AIRCRAFT DIV., UNITED AIRCRAFT CORP. 105
Agency—G. F. Sweet & Co., Inc.

REPUBLIC STEEL CORP. 23
Agency—Meldrum & Fewsmith, Inc.
RESIN INDUSTRIES, INCORPORATED 4
Agency—Tatnall & Young Adv.
RHEEM MFG. CO., GOVERNMENT PRODUCTS DIV. 24
Agency—Campbell-Ewald Co.
ROE CANADA LIMITED, A. V. 97
Agency—Cockfield, Brown & Co., Ltd.
ROE & COMPANY LIMITED, A. V. 79
Agency—Dolan, Davis, Whitcombe & Stewart, Ltd.
ROHR AIRCRAFT CORPORATION 84
Agency—Barnes Chase Company
ROYAL AIRCRAFT CORPORATION 35
Agency—Kau-Van Pierson-Dunlap, Inc.

SAGINAW STEERING GEAR DIV., GENERAL MOTORS CORP. 50, 51
Agency—Price, Tanner & Wilcox, Inc.
SARGENT ENGINEERING CORPORATION 43
Agency—Darwin H. Clark Co., Adv.
SCOTT & PEPPER COMPANY 80, 81
Agency—J. Walter Thompson Co.
SEARCHLIGHT SECTION 90, 91, 92, 93, 94, 95
SHELL OIL COMPANY 21
Agency—J. Walter Thompson Co.
SIMMONDS AEROCESSORIES, INC. 72
Agency—Burke Dowling Adams, Inc.
SOCONY-VACUUM OIL CO., INC. 31
Agency—Compton Advertising, Inc.
SPERRY GYROSCOPE CO., DIVISION THE SPERRY CORP. ..... Third Cover
Agency—Roche, Yates & Mattson, Inc.
STEWART WARNER CORP. (SOUTHWIND DIVISION) 100
Agency—MacFarland, Aveyard & Co.
STILLMAN RUBBER CO. 89
Agency—Lotis Western, Inc.
SURFACE COMBUSTION CORP. (JANITROL AIRCRAFT-AUTOMOTIVE DIV.) 83
Agency—Osborne Industrial Adv.

THOMPSON AIRCRAFT TIRE CORP. 87
Agency—Norton M. Jacobs Adv. Agency
TRANSPORT EQUIPMENT COMPANY 66
Agency—Jaircraft Co.

UNITED AIRCRAFT PRODUCTS, INC. 41
U. S. STEEL SUPPLY DIV. UNITED STATES STEEL CORP. 103
Agency—Batten, Barton, Durstine & Osborn, Inc.

VERSON ALLSTEEL PRESS COMPANY 32
Agency—Russell T. Gray, Inc.

WEMAC COMPANY 82
Agency—McKee-Burns Adv.
WESTINGHOUSE ELECTRIC CORP. 76, 77
Agency—Fuller & Smith & Ross, Inc.
WHITTAKER CO., LTD., WM. R. 37
Agency—Mogge-Privett, Inc.

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilts, Mgr.

EMPLOYMENT
Positions Vacant 90-94
Selling Opportunities Offered 94
Positions Wanted 94
Selling Opportunities Wanted 94
SPECIAL SERVICES
To the Industry 94
BUSINESS OPPORTUNITIES
Wanted 94
PLANES—EQUIPMENT
(Used or Surplus New)
For Sale 94-95

career opportunities in

Nuclear

AIRCRAFT

PROPULSION

for Engineers • Physicists
Chemists • Metallurgists

Here's a genuine opportunity if you are an engineer or scientist who wants to build a sound, well-rewarded career in private industry.

We are engaged on a development program on a reactor-powered aircraft engine. Because of this, we have an immediate need for engineers and scientists with training or experience in nuclear engineering or related fields—Thermodynamics, Heat Transfer, Controls, Reactor Physics, Theoretical Physics, Physical Chemistry, Stress and Vibration, High-Temperature Metallurgy.

If you can qualify, we can offer you an opportunity to work for us on one of today's most challenging assignments—a chance to be in on the early development of a great and revolutionary advance in aircraft propulsion.

At Pratt & Whitney Aircraft you'll be working for the world's foremost designer and builder of aircraft engines, on a project that will give you a *real* chance for professional growth and recognition.

Please send us immediately a complete resumé covering your training and experience. Write Mr. Paul Smith, Employment Office.

PRATT & WHITNEY AIRCRAFT
Division of United Aircraft Corp.
East Hartford 8, Connecticut

EDITORIAL

Persuading Motorists to Fly

Instead of trying merely to capture passengers from competing air carriers, Continental Air Lines is launching a campaign to divert motorists to the air.

Convinced that thousands of auto miles can be converted to plane travel, especially between major distant points, the company will increase its advertising to extol the savings of air travel over car travel.

"Twelve cents a mile AUTO or 6½ cents a mile AIR," is the theme. Copy will show figures of costs per mile of operation for 13 leading makes of cars driven over 10,000 mi.

Since readership surveys conducted by some magazines have revealed high interest on the part of the public in information on motor cars and their costs, Continental may have a popular and effective campaign.

Costs to be shown include the per-mile rate both to operate a car and to own a car; total costs per mile will be listed for a car bought with cash, and also for a car that is being financed. The average of 12 cents a mile results, excluding cost of meals, tips and hotels.

"Intercity traffic by auto is an untouched market for ready sales of air travel," Stanley Halberg, Continental vice president, believes.

Continental should also stress the vital time element, with the dramatic differences in elapsed hours for car and air trips. Fatigue and comfort contrasts are worthy of attention. The airlines' family fare plan should be promoted vigorously in the campaign, to answer the motorist's frequently expressed opinion that he can take his brood in the car so much cheaper.

The railroads have complained bitterly for years about what the competition of the motor car has done to their business. But it was years before they recognized the threat sufficiently to direct their advertising to drivers. While the speed differential between car and plane is greater than between car and train, and represents no similar threat to air, it is still gratifying to see an airline recognize a good market when it sees one.

Too much airline advertising is still unimaginative and undramatic, lacking the personal touch that tells the layman exactly what air transportation can mean to him. Continental's brisk discussion of cars and their costs is talking popular language, and with something like 50 million cars operating, that is quite a sizable public!

Slow Down the Mails!

It seems a bit late, even for the railroads, but we expected it to happen. Seventy-two of them protest continuation of the government's use of the airlines for three-cent letter mail.

They propose a full-dress investigation by Civil Aeronautics Board, including painstaking and laborious inquiry into a practice they feel is violating a law. They believe there is a law that provides that postage rates for all mailable first-class matter being sent by air shall be six cents an ounce.

What is the basis for the complaint? Poorer service to the public? Hardly that! The complaint is that the railroads already have lost $825,000 to the airlines on New York-Chicago three-cent mail traffic alone. They say extension of the service would "make more likely the loss permanently of revenues."

Of course, they are probably absolutely right. But they ignore the profound objective the Post Office Department had in mind when it launched this revolutionary experiment. The government seeks to render the public a better mail service, and we are convinced that in this respect, at least, the experiment is an unqualified triumph. It seems exceedingly doubtful that the P.O. would jump into such a sweeping revision of traditional practice without first scrutinizing the federal code!

And if we read our history books correctly, the railroads showered little sympathy on the canal boats they superseded. Neither did the public. This country's citizens will always demand improved services. If this were not the case, the canal boats would still be carrying the mails, freight and passengers.

The railroads appear much better off than the canal boats. They are, indeed, bound to be about washed up in another five or ten years as far as longhaul passenger business is concerned, but they should continue to be with us for quite a time to handle our bulky, low-value freight shipments.

Helping Communities in Trouble

The remarkable abilities and record of the helicopter in saving human life is one of the noblest facets of aviation. Those of us in the business now take this unique attribute of the helicopter in pretty much of a sophisticated, casual manner, because already it's an old story—even though great.

Even so, all of us realize the copter has only begun its mercy services to the world, and there are many brilliant achievements yet to be marked up on its record.

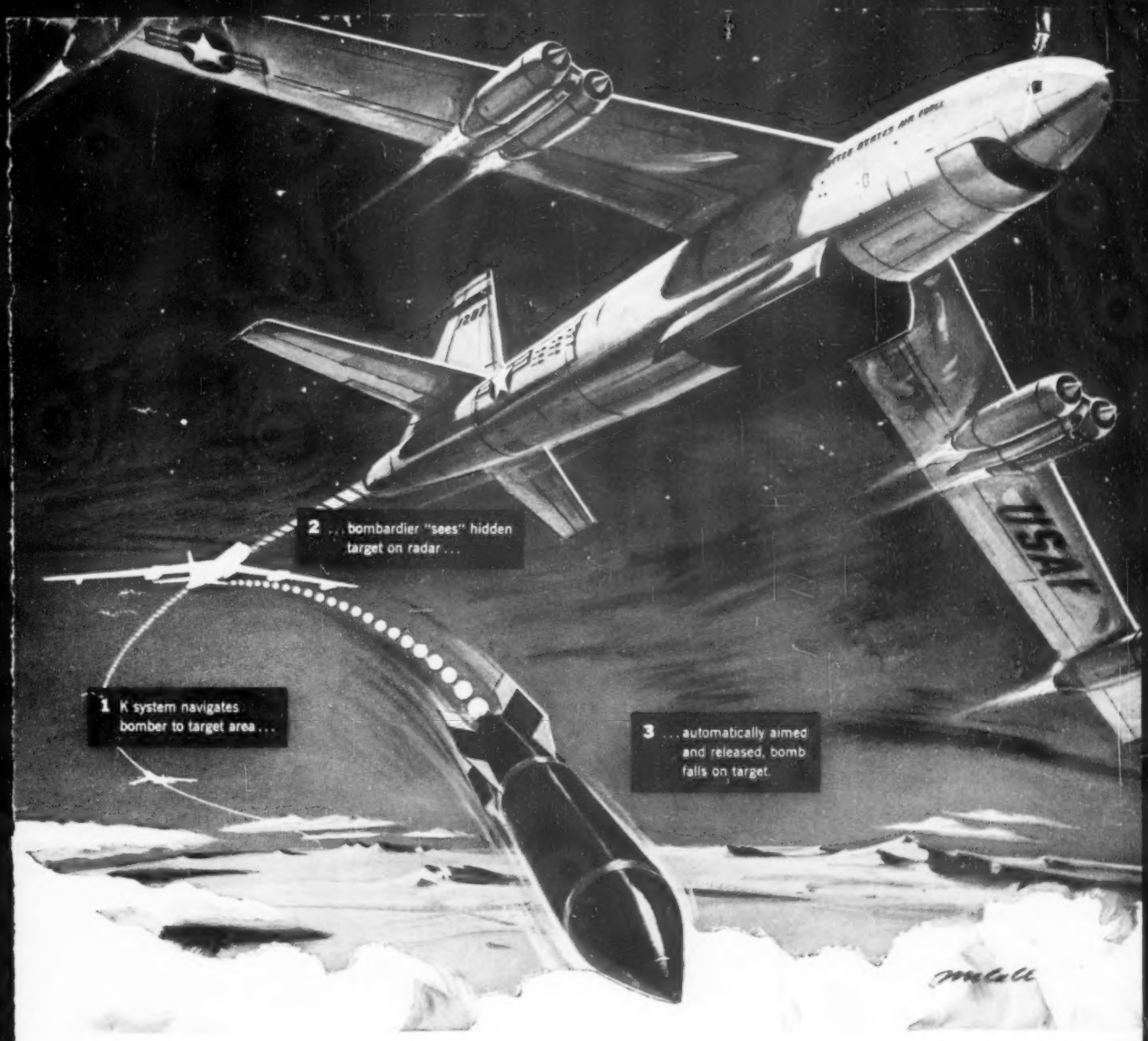
Ownership and operation of helicopters by police and other government services is becoming almost common. Someday every municipality must own at least one.

In the meantime, however, it is a source of pride to us in aviation that several aircraft companies have offered their own helicopters to their communities in times of trouble.

Douglas Aircraft Co. has made its three-place Bell available to Santa Monica's police and fire department in any emergency.

North American Aviation, which leases a Bell from a commercial operator, has used it on several occasions to assist Los Angeles County lifeguards in rescuing children from drowning.

Other similar examples of free civic service by aviation company owners of helicopters are probably well known by citizens of many sections of the country. We hope there will be more. We know the helicopter will continue, with increasing frequency, to remind the world that aviation is and can always be a merciful protector of human life. —Robert H. Wood


2 . . . bombardier "sees" hidden target on radar . . .
1 K system navigates bomber to target area . . .
3 . . . automatically aimed and released, bomb falls on target.
USAF

USAF DESTROYS UNSEEN TARGETS; PLANES USE RADAR BOMBSIGHT

THE STORY BEHIND THE STORY:

■ You've read headlines like the one above, reporting the precision of Air Force bombing—during tests. Within hours after an aggressor attack, you would read them again—reporting deadly counteraction. Night or day, regardless of weather, America can carry out its policy of instant retaliation to any aggressor—in any part of the world.

■ Now in large-scale production, the Air Force K Bombing System combines automatic navigation with all-weather identification and bombing of any target. With the aid of the Sperry Gyropilot* Flight Control and the K System, the crew flies the high-speed bomber to the target area. Using the Sperry-designed Bombing Navigational Computer, the bombardier locates the target optically, or if hidden, by radar. The effects of speed, altitude and wind on the falling bomb are automatically computed, enabling the bombardier to score direct hits. In simplifying the complex job of bombing at extreme altitude from high speed jets, the K System permits more time and flexibility on the bomb run . . . more certainty of "mission completed."

■ There's little resemblance between this automatic "brain" and the first bombsight developed by Sperry for use in World War I—a simple telescope and range scale no larger than an egg beater. But both were made possible because a military-industry team anticipated the needs of modern defense—then met those needs with a strategic bombing program which authorities credit with helping to prevent a new global war.

*T.M. REG. U.S. PAT. OFF.

SPERRY GYROSCOPE COMPANY

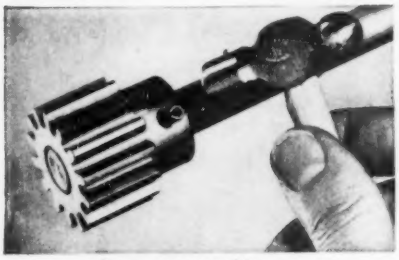
DIVISION OF THE SPERRY CORPORATION • GREAT NECK, N. Y.

E B POWER GS I
UNIVERSITY MICROFILM IN
313 N 1ST ST
ANN ARBOR MICH

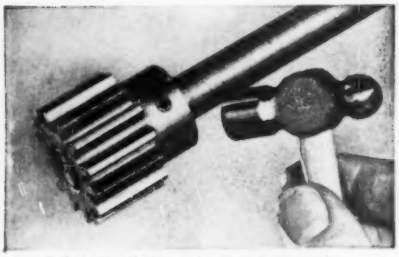
Where can you use this simple fastener?

No threading, peening or precision drilling with ROLLPIN

Rollpin is driven into holes drilled to normal production-line tolerances.



It compresses as driven.



Rollpin fits flush . . . is vibration-proof.

Rollpin is the slotted tubular steel pin with chamfered ends that is cutting production and maintenance costs in every class of industry.

This modern fastener drives easily into standard holes, compressing as driven. Its spring action locks it in place—regardless of impact loading, stress reversals or severe vibration. Rollpin is readily removable and can be re-used in the same hole.

* * *

If you use locating dowels, hinge pins, rivets, set screws—or straight, knurled, tapered or cotter type pins—Rollpin can cut your costs. Mail our coupon for design information.

Elastic Stop Nut Corporation of America
Dept. R16-925 Vauxhall Road, Union, N. J.

Please send me the following free fastening information:

☐ Rollpin bulletin
☐ Elastic Stop Nut bulletin
☐ Here is a drawing of our product. What fastener would you suggest?

Name _____ Title _____
Firm _____
Street _____
City _____ Zone _____ State _____